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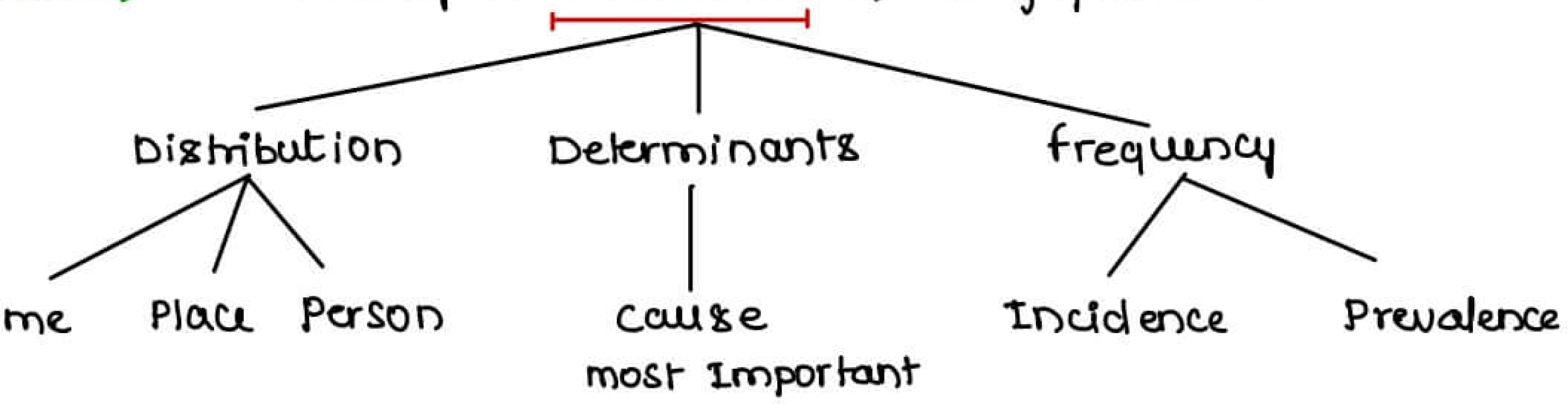
EPIDEMIOLOGY → Among People Study

→ Defination → Study of Diseases in a population



– Defined by John M. Last

DISTRIBUTION

TIME / SEASONAL DISTRIBUTION

		Season	Vector
1.	Malaria	→ Rainy	→ Anopheles
2.	Dengue	→ Rainy	→ Aedes aegypti [Tiger Mosquito]
3.	Typhoid	Rainy	
4.	Cholera		
5.	Polio	→ Rainy	
6.	Rotaviral	→ Winter	

Respiratory Infections

7.	Measles	Winters
8.	Mumps	
9.	Rubella	
10.	Chicken pox	
11.	H_1N_1	
12.	Diphtheria	
13.	Pertussis	

the Droplet size that transmits most efficiently → < 5 μ

Inter personal distance where transmission is max → < 1 metre

[Try to maintain an arm length from patients in OPD]

14.	DM	No seasonal distribution for commonly occuring non-communicable diseases
15.	HTN	
16.	CHD	
17.	Cancers	
18.	RTA	→ Winter, Rainy
19.	HIV	→ No seasonal Distribution
20.	Hay fever	→ Spring, Winter [Pollen, Dust]
21.	Asthma	→ Winter

PLACE DISTRIBUTION → Geographical Distribut^n

		PLACE	VECTOR
1.	Kala Azar	UP, WB, Bihar, Jharkhand	Phlebotomus [Sand Fly]
2.	Japanese encaphalitis	UP, WB	Culex Tritenio rhyncus C. vishnuii C. Gelidus
3.	KFD	Kyasanur forest [karnataka]	Hard Tick [Hemophysalis spinigera]
4.	Malaria	East & North East India	Anopheles
5.	Filariasis	Costal Regions of India	Culex quinquefasciatus [c. fatigans]
6.	Fluorosis	Central & western India	
7.	HIV	High Prevalence States [7] Tamilnadu, Karnataka, Andhra Pradesh Maharastra, Nagaland, Manipal, Mizoram Moderate Prevalence States [3] Gujarat, Goa, Pondicherry Low Prevalence States All other parts of India Max reported in world South Africa, Nigeria, India	
8.	DM	1. China 2. India	

New Diseases

India [Emerging /
Re emerging]

H_1N_1 [swine flu]	Metros	
Congo fever	Gujarat, Delhi	Hyaloma Hard ticks
Litchi Virus Disease	West Bengal	d/t MCG
Ebola Virus	Delhi	d/t Body Fluids
Zika Virus	Gujarat, Tamilnadu	Aedes
Plasmodium Ovale	Gujarat, WB, Delhi, Mumbai	
NIPAH Virus	WB, Kerala	fruits c̄ Bat secretions
WEST NILE FEVER	Kerala	

NEW DISEASES

WORLD

H_1N_1 → Mexico, South Asia

H_5N_1 [Bird flu] → Hongkong, South Asia, ~~India~~

H_7N_9 → China [2013]

MERS [middle east Resp. syn.] → Middle East countries

Ebola → Africa

Zika → Africa

SARS & MERS by corona virus → MERS-COV

PERSON DISTRIBUTION

Age Distribution

Measles → 6 months – 3 yrs

Mumps → 5 – 9 yrs [school going Age]

Chicken Pox → 5 – 9 yrs [school going Age]

H_1N_1 → NO Age Distribut^{n}

Rhumatic fever → 5 – 15 yrs

Typhoid / Cholera → NO Age Distribution

Rota virus → Younger Infants

Neonatal Tetanus → Neonates

Polio → 0 – 5 yrs

DM → > 40 yrs

HTN → > 40 yrs

CHD → > 40 yrs

Cancers → > 50 yrs

Cataracts → > 50 yrs

Age Groups

Child → 0 – 18 yrs

Adolescent → 10 – 19 yrs
- → 10 – 13 yrs [early]
- → 14 – 16 yrs [mid]
- → 17 – 19 yrs [Late]

Reproductive Age group → 15 – 49 yrs

Geriatrics → > 60 yrs

Perinatal Period → 28 WKS POG till 7 days post delivery

Period of viability → POG > 28 WKs OR BW > 1000gms OR BL > 35cm

Abortion → POG < 28 WKs OR BW < 1000gms OR BL < 35cm

Still Birth → POG > 28 WKs OR BW > 1000gms OR BL > 35cm

- BW is most sensitive

HUMAN POVERTY INDEX

→ Earlier categories HPI 1 [for Developing countries]; HPI 2 [for developed countries]

→ Now → MDPI [Multi Dimensional Poverty Index]

MDPI

components

INDICATORS	SUB INDICATORS
a. Health	Child mortality Nutrition
b. Educatn	Years of schooling School attendance
c. Living Standards	Fuel Water Electricity Toilet Floor Assets

Range → 0 < MDPI < +1

INDIA → 0.121 [27.5% poor]

INTERPRETATn

20 – 33.33% → vulnerable to poverty
>33.33% → Poverty
> 50% → Severe Poverty

Overall → Deprivatn in > 1/3 is POVERTY

BPI [Below Poverty Line]

1. Colorie Intake

- Rural → < 2400 K.cal / Day ★
- Urban → < 2100 K.cal / Day ★

2. Income Per Capita

	Tendulkar committee 2011-12	Rangarajan committe 2013-14
– Rural	< 27/- per day	< 32/- per day
– urban	< 33/- per day	< 47/- per day
	– 22% BPL	– 29.5% BPL

COHORT STUDY	CASE CONTROL STUDY
→ Forward	→ Backward
→ Prospective	→ Retrospective
100 Smokers (2020) ⟶ Lung Cancer (2035)	Smoking (2005) ⟵ 100 Lung cancers (2020)
o ⟶	⟵ o
→ Cause ⟶ Effect Exposure ⟶ Outcome Risk factor ⟶ Disease	→ cause ⟵ Effect Exposure ⟵ outcome Risk factor ⟵ Disease

COHORT STUDY

	Exposed		Non - Exposed
→ 2020	100 smokers	→	100 Non smokers
	↓		↓
2035	80 Lung cancers		10 Lung cancers

– Golden rule of Epidemiology → Always take comparision

→ 2 groups → Exposed, → Non Exposed } & we wait for occurence of same disease in both groups & then compare

→ Results calculated by → STRENGHTH OF ASSOCIATION

Strength of Association is given by

1. Relative Risk
2. Attributable Risk
3. Population Attributable Risk

Relative Risk

→ $\boxed{RR \rightarrow \frac{I_e}{I_{ne}}}$

I_e → Incidence in exposed

I_{ne} → Incidence in non exposed

$$RR \rightarrow \frac{80/100}{10/100} \rightarrow 8$$

→ implies, smokers are relatively 8 times higher risk of Lung cancer as compared to Non-Smokers

→ RR ≃ Risk Ratio → Ratio of developing Lung cancer b/w smokers and Non smokers → 8:1

- → RR > 1 → Associatⁿ present
- RR = 1 → No Association
- RR < 1 → Negative / Inverse Association → Risk factor is protective

Attributable Risk [AR] / Excess Risk / Absolute Risk / Risk Difference

→

$$\boxed{AR \longrightarrow \frac{I_e - I_{ne}}{I_e} \times 100} \longrightarrow \frac{80/100 - 10/100}{80/100} \times 100 \longrightarrow 88\%$$

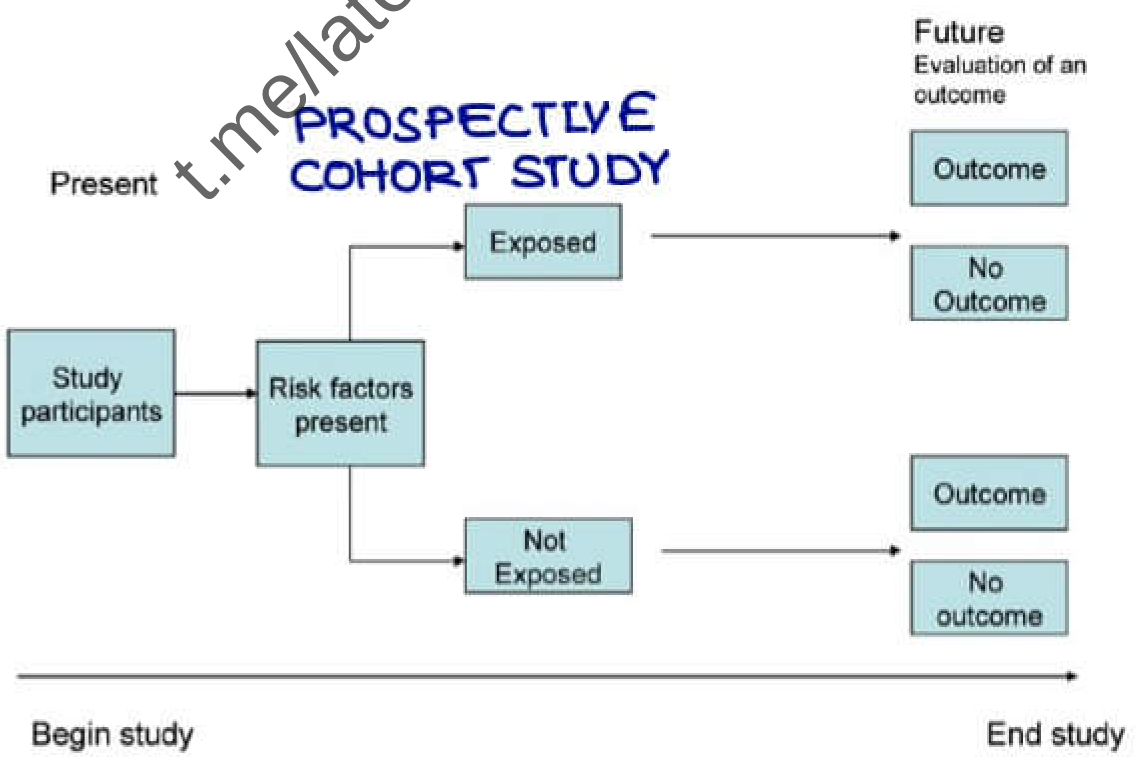
→ Interpretation → 88% of Lung cancer can be attributed to smoking

Population Attributable Risk [PAR]

→

$$\boxed{PAR \longrightarrow \frac{I_{Total} - I_{ne}}{I_{Total}} \times 100} \longrightarrow \frac{90/200 - 10/100}{90/200} \times 100 \longrightarrow 77\%$$

→ Interpretation → If smoking is eliminated from the same population then there will be a 77% reduction of new cases/ Incidence of Lung cancer every year in the same population



Clinician mainly concerned with	→	Relative Risk
Epidemiologist concerned with	→	Attributable Risk
PH Programme Manager concerned with	→	Populatⁿ Attributable Risk

COHORT STUDY

- → Forward looking study
- → Prospective study
- → cause to Effect study
- → Risk factor to Disease study
- → Exposure to outcome study
- → Follow up study
- → Incidence study

FRAMINGHAM HEART STUDY

- → Most popular cohort study
- → for CAD [Coronary Artery Disease]
- → in 1948, USA
- → made a list of Risk factors
- → Age group → 30-62yrs
- → Sample size → 4469 → Divided in to exposed & non exposed groups
- → Checking of Incidence of CHD every 2 yrs
- → Framingham → Town in USA
- → Type of COHORT Study

→ Cohort defined as Group of Individuals having same Characteristic

→ minimum no. of cohorts required in a cohort study → 02

CASE CONTROL STUDY & COMBINED DESIGNS

CASE CONTROL STUDY

2005 → 70 Smokers ↑ History — 10 Smokers ↑ History

2020 → 100 Lung cancers [Diseased] — 100 Healthy People [Non Diseased]

↑ CASES — ↑ CONTROLS

→ 2 groups — cases, controls } & we ask history of same exposure in both the groups & then Compare

Strength of Association → Given by ODD's Ratio / CROSS PRODUCT RATIO

→ Odd's Ratio → $\frac{ad}{bc}$

→ $\frac{70 \times 90}{10 \times 30}$

→ 21

		DISEASE Present	DISEASE Absent
History	Present	a 70	b 10
	Absent	c 30	d 90
		a+c	b+d
		Cases	controls
		100	100

→ Interpretation

- OR > 1 → Association Present
- OR = 1 → No Associatⁿ
- OR < 1 → Inverse / Negative Associatⁿ → RF is protective

→ Lung cancer cases have 21 times more chance of reporting History of smoking as compared to healthy people in the study

Case control Study

→ Backward looking study
→ Retrospective study
→ Effect to cause Study
→ Disease to Risk factor study
→ Outcome to exposure study

→ TROHOC study
→ case reference study

	case	control
→ Ideal Ratio for Good case control Study →	1 :	4
minimum ratio for case control study →	1 :	1

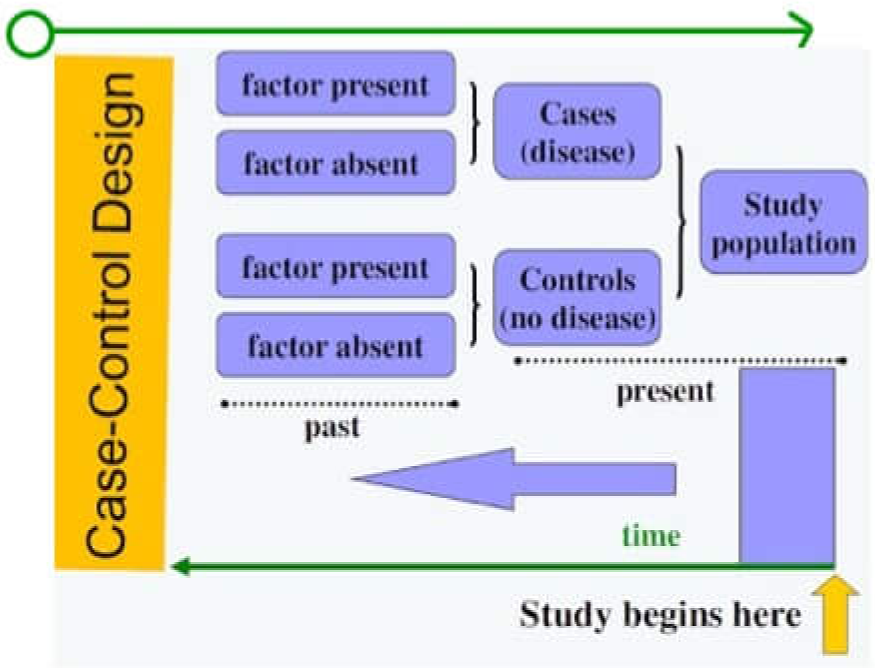
COHORT STUDY	CASE CONTROL STUDY
→ Time consuming study	→ Quicker study
→ Expensive study	→ Cheaper Study
→ Incidence, RR [more accurate]	→ Odd's Ratio
→ No Recall Bias	→ Recall Bias + nt
→ Loss to follow up [Attrition] • Max allowable attrition Rate < 5% • Ideal retent^n rate ≥ 95%	→ No loss to follow up
→ HAWTHORN BIAS – Study subjects alter their behavior 2out notice	→ NO Hawthorn Bias
→ Ethical Problems present	→ NO Ethical problems
→ Not useful for rare diseases	→ useful for Rare diseases
→ multiple OUTCOMES can be Studied together	→ multiple RISK FACTORS can be studied together

➡ Cohort Study is Best study than Case control study → b/c most accurate

Cohort Study
Smoking ⟶ Lung CA
2020 2035
Incidence, RR

RETROSPECTIVE COHORT STUDY
[combinat^n of both]
↓
Smokers ⟶ Lung CA
2005 2020
Incidence, RR, saves time

Case Control study
Smoking ⟵ Lung CA
2005 2020
ODD's Ratio



MIXED COHORT STUDY

→ combinatⁿ of both retrospective & prospective cohort study

Smokers 2005 $\xrightarrow{RC}$ Lung CA 2020 $\xrightarrow{PC}$ Lung CA 2030

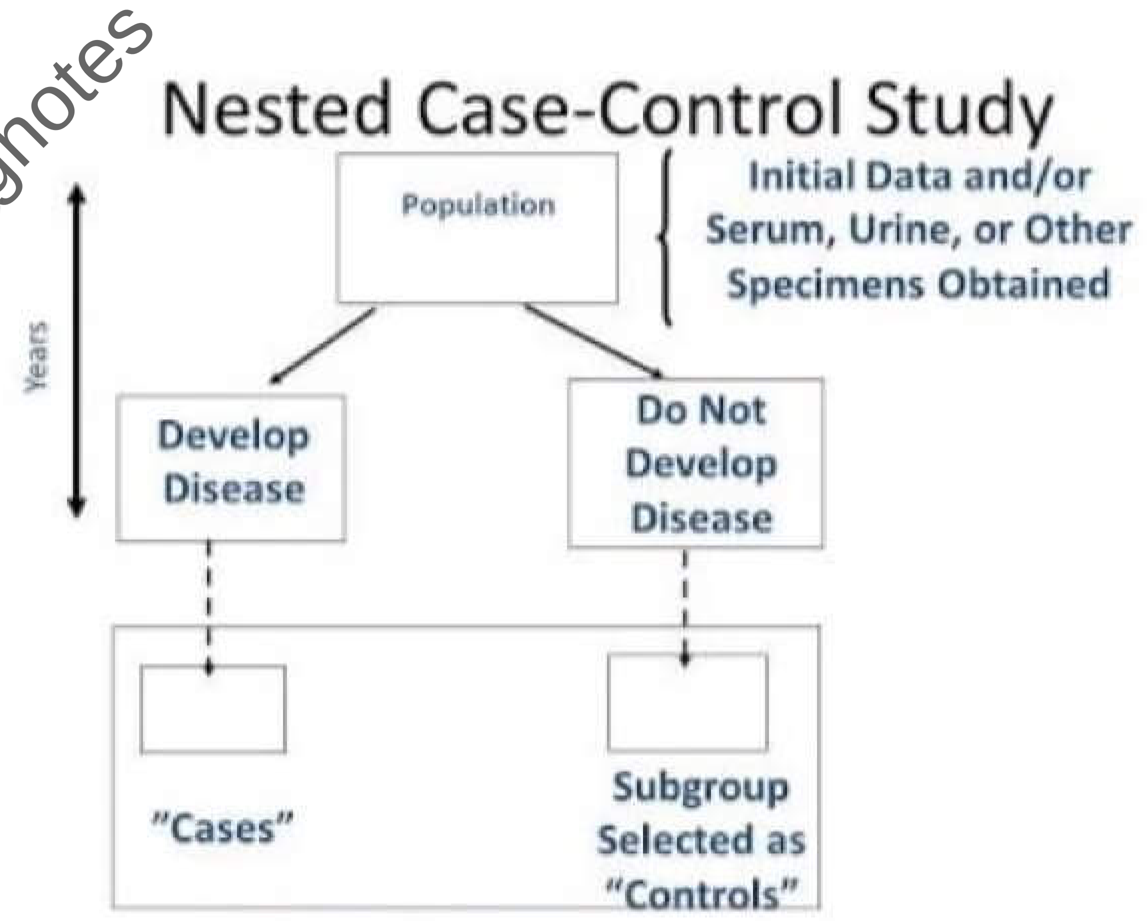
Alcoholics 2020 ⟶ CHD 2040 ⟶ Prospective cohort study

Alcoholism 2000 ⟵ CHD 2020 ⟶ Case control study

Alcoholism 2000 ⟶ CHD 2020 ⟶ Retrospective cohort study

Alcoholics 2000 ⟶ CHD 2020 ⟶ CHD 2025 ⟶ Mixed cohort study

NESTED CASE CONTROL STUDY


Nested Case-Control Study
Population
Initial Data and/or Serum, Urine, or Other Specimens Obtained
Years
Develop Disease
Do Not Develop Disease
"Cases"
Subgroup Selected as "Controls"

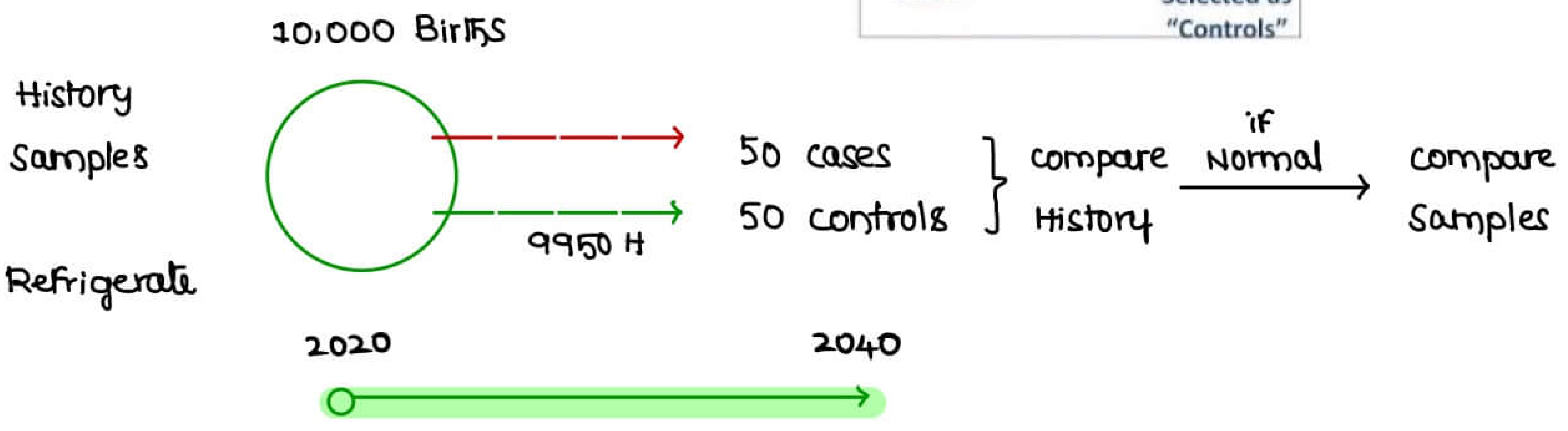
→ Type of cohort study

→ Temporality → forward looking study

→ Only done if

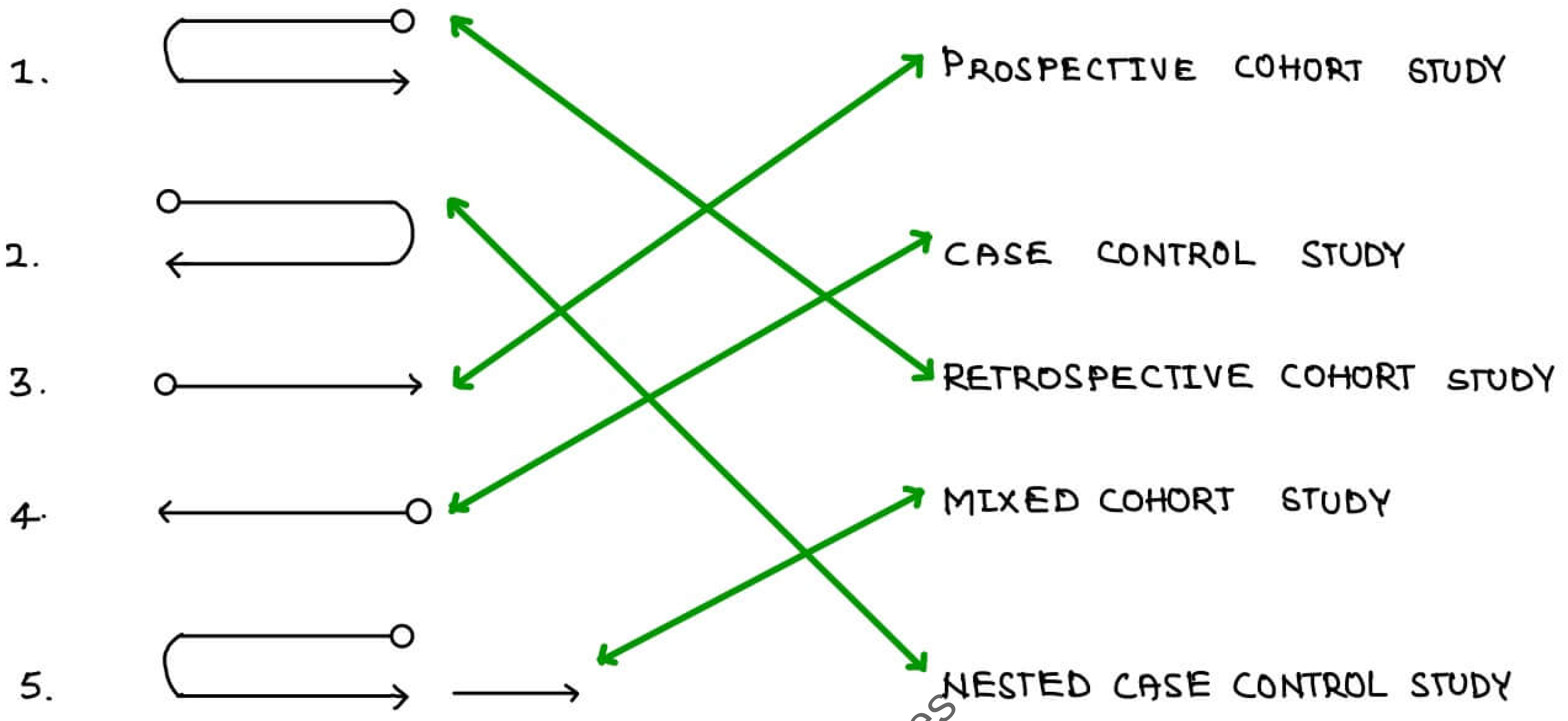
1. Disease New & Rare
2. Diagnostic tests very Expensive

→ Eg → Stem cell Banking



→ A Nested case control study is a small case control study which is nested in a Big cohort study

	AT START OF STUDY		
	EXPOSURE		OUTCOME
Prospective cohort study	✓	○————→	🚫
Case control study	✓	←————○	✓
Retrospective cohort study	✓	○————→	✓
Mixed cohort	✓	○————→	✓ ○————→ ✓
Nested Case Control Study	✓	○————→	🚫



Retrospective cohort study	>	Prospective cohort study	>	Case control study
incidence		Incidence		Odd's Ratio
Relative Risk		Relative Risk		
Saves time				

OTHER ANALYTICAL STUDIES

CROSS SECTIONAL STUDY / SNAPSHOT STUDY / PREVALENCE STUDY

→ Done at At a point time , neither forward or backward

→ Eg.

2020

smokers → 26%

Lung CA → 01%

→ Can't calculate Strength of associat^n

→ Gives Prevalence

→ Based on primary data [Investigator collects data himself]

ECOLOGICAL STUDY / CO-RELATIONAL STUDY

→ Done at a point of time

→ Used in Nutritional surveys

Eq → Avg. fat intake = 20gm/day

→ Can't calculate Strength of Associat^n or Prevalence

→ Based on secondary data [collected by some one else, studied by investigator]

RCT > RCS > PCS > CC > CS > E

UNIT OF STUDY

UNIT OF STUDY	
cohort	→ Individual
CC	→ Individual
CS	→ Individual
E	→ Population
RCT	→ patient / case
Descriptive	→ Populatⁿ

→ Results of Study Applicable on

→ cohort
case control
cross sectional } Individual

Ecological → Populatⁿ → Ecological fallacy

→ All analytical studies are individual except Ecological

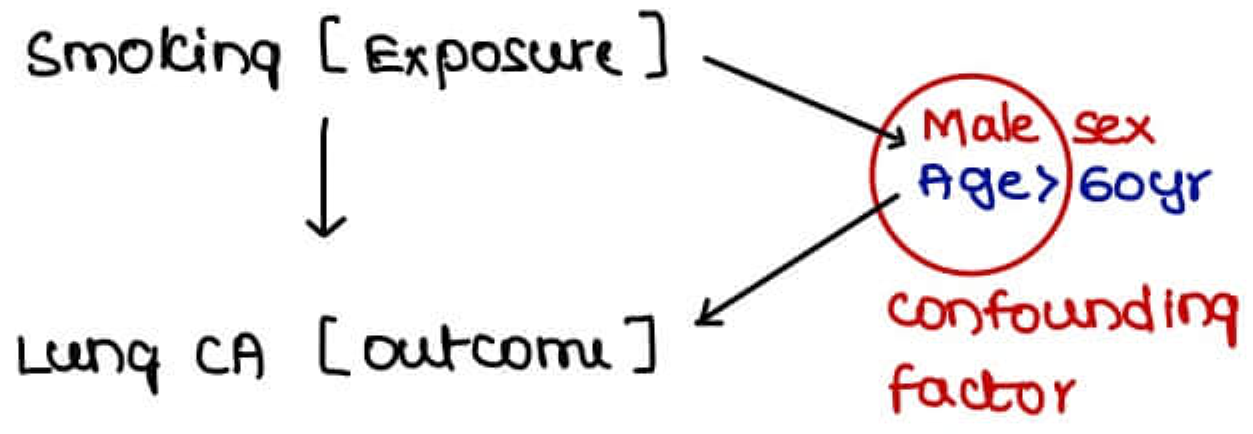
CONFOUNDING & BIAS

CONFOUNDING = Error

→ Any factor associated both c̄ exposure & outcome

↓ leads to

mistaken estimate of outcome



2020	100 smokers	100 Non smokers
	>60y ↓ Male >60y Males	<20y ↓ Female >60y Males
2035	~~80~~ Lung CA	10 Lung CA
	~~90~~ 80	
	~~86~~ 80	

→ confounding can be removed by MATCHING
- Equal distributⁿ of confounding factors in both the groups

→ confounding can be removed by
1. Matching → MC used / Simplest
2. Randomisatⁿ → 2nd Best Method
3. Restrictⁿ
4. Stratificatⁿ
5. Statistical Modelling / Multivariate analysis
6. Stratified Randomisatⁿ → Best method

BIAS

→ Type of Systematic error

→ 3 Groups

Subject Bias	• Recall Bias (case control study) • Hawthorn Bias [cohort study]
Investigatory	• Interviewer Bias → eliminated by devoting equal time • Selectⁿ Bias • misclassificatⁿ Bias
Analyser	• Calculatⁿ Error → Not seen now a days

BERKESONIAN BIAS → d/t different hospital admission rates
→ Eg

Medical college 2020	Medical college 2021
No oncology Department	Oncology Department +nt
↓	↓
$\frac{1}{100\ OPD}$	$\frac{10}{100\ OPD}$

→ Based on location & reputatⁿ of an institute
→ Type of Investigator Bias

PYGMALION BIAS → ↑ed motivatⁿ by Teachers, ↑ the marks of Students
→ Type of Investigator [3rd person] Bias → selectⁿ Bias

GOLEM BIAS → Demotivatⁿ by Teachers can decrease marks of Students

BLINDING

Types

Single Binding → Subjects are not aware of Rx
Used to remove Subject Bias

Double Blinding → Subject & investigator not aware
removes Subject & investigator Bias
mc seen Blinding

Triple Blinding → Subject, Investigator & Analyser not aware
Removes Subject, Investigator & Analyser Bias
Best Blinding

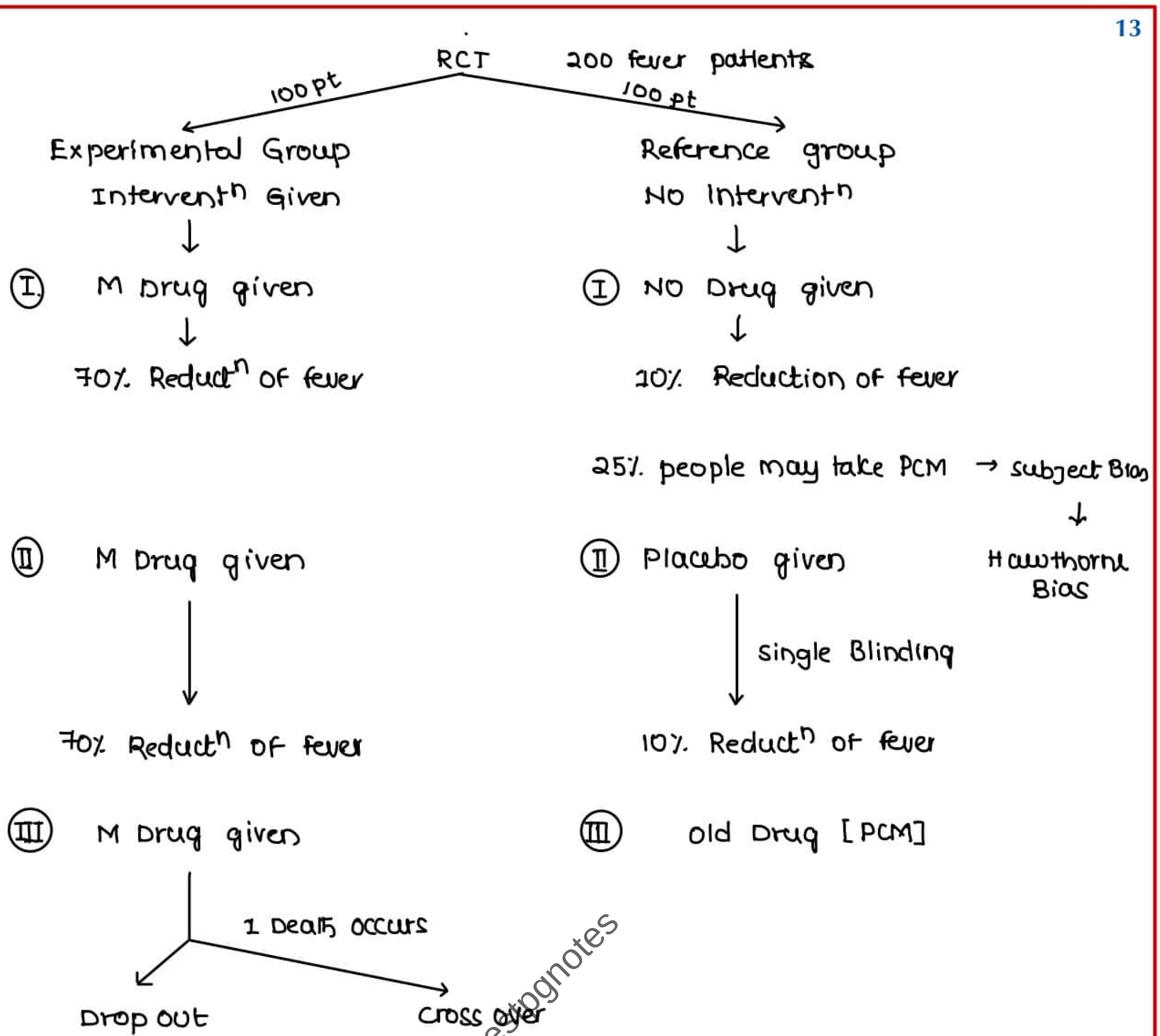
Open Study → complete absence of Blinding

RCT, TRIALS

RANDOMISED CONTROL TRIAL [RCT]

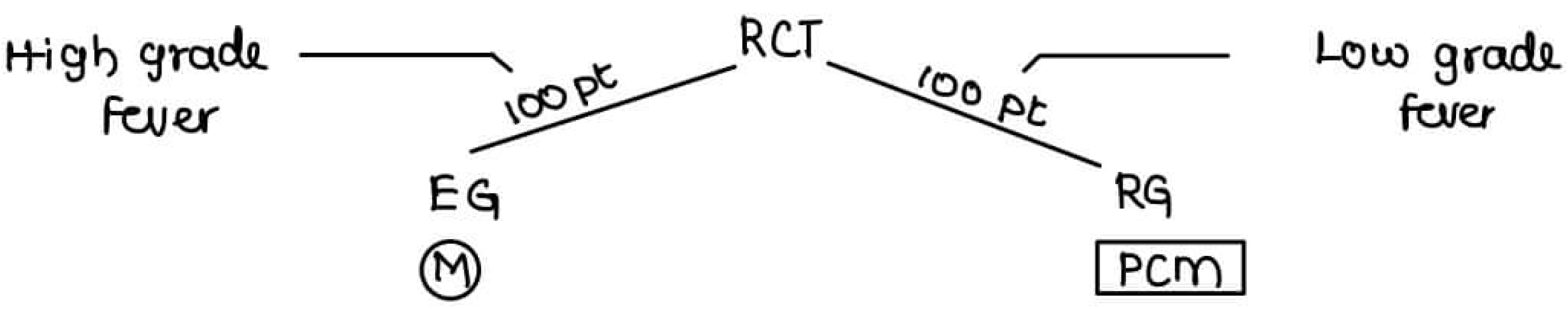
RANDOMISED	CONTROL	TRIAL
Equal & Known chance	Comparisⁿ Group	New Drug

→ A New Antipyretic Drug → M
→ Unit of study → Patient / cases



→ ITT [Intentⁿ to Treat Trial] → Results of RCT are not affected by death, Dropouts or cross overs

→ In Pre clinical Trials → came to know that Ⓜ works only if fever >103°F
→ Company Hides it &



- Selectⁿ Bias
- Selectⁿ Bias in RCT removed by Randomizatⁿ

Randamisation applied

1. At Selectⁿ of 200 pts
2. At distributⁿ into EG & RG ← Best time for Randomizatⁿ
3. At Medicatⁿ
4. At comparision of Results

→ Randomisat^n Remove → select^n Bias
Remove → confounding

Matching removes → confounding

Blinding removes → Bias

→ RCT > RCS > PC > CC > CS > E

Types of Randomised Trials

1 clinical Trials
2 Preventive Trials
3 Risk factor Trials
4 Cessat^n Experiment
5 Trial of etiological Agents
6 Evaluat^n of Health services

Types of Non Randomised Trials

1 uncontrolled Trials
2 Natural Experiment
3 Before & After comparision Studies

CLINICAL TRIALS

Phase I → Healthy Human Volunteers
Done for safety & non - toxicity
max. tolerated dose tested

Phase II → Patients
Done for Efficacy
max. drug failure is seen

Phase III → Patients
Comparision c̄ existing drug
New Drug launched in market
RCT done
most Important phase

Phase IV → Patients
Done for long term side effects
Post Marketing surveillance
Longest – Time period → life long [ideal] or 10-25yrs

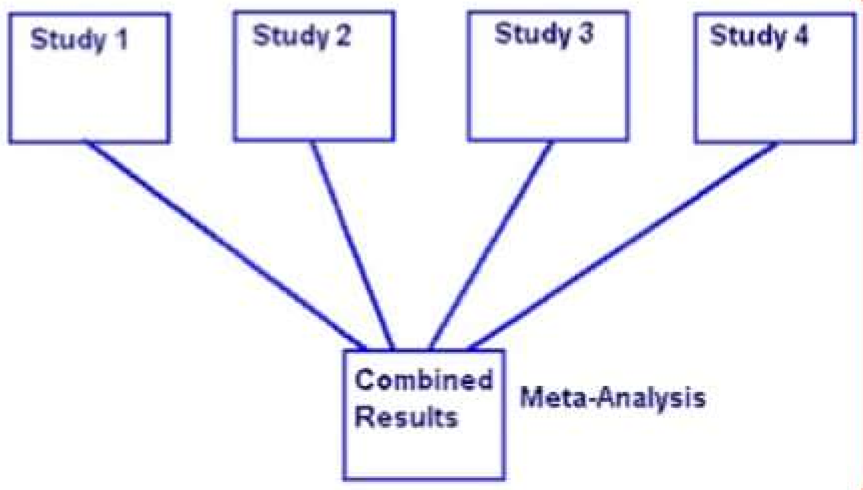
Phase 0 → Healthy human volunteers
For microdosing [eg. 1/10th dose]

→ Pre clinical Trials done in Animals

EBM, META ANALYSIS, Other studies

META ANALYSIS

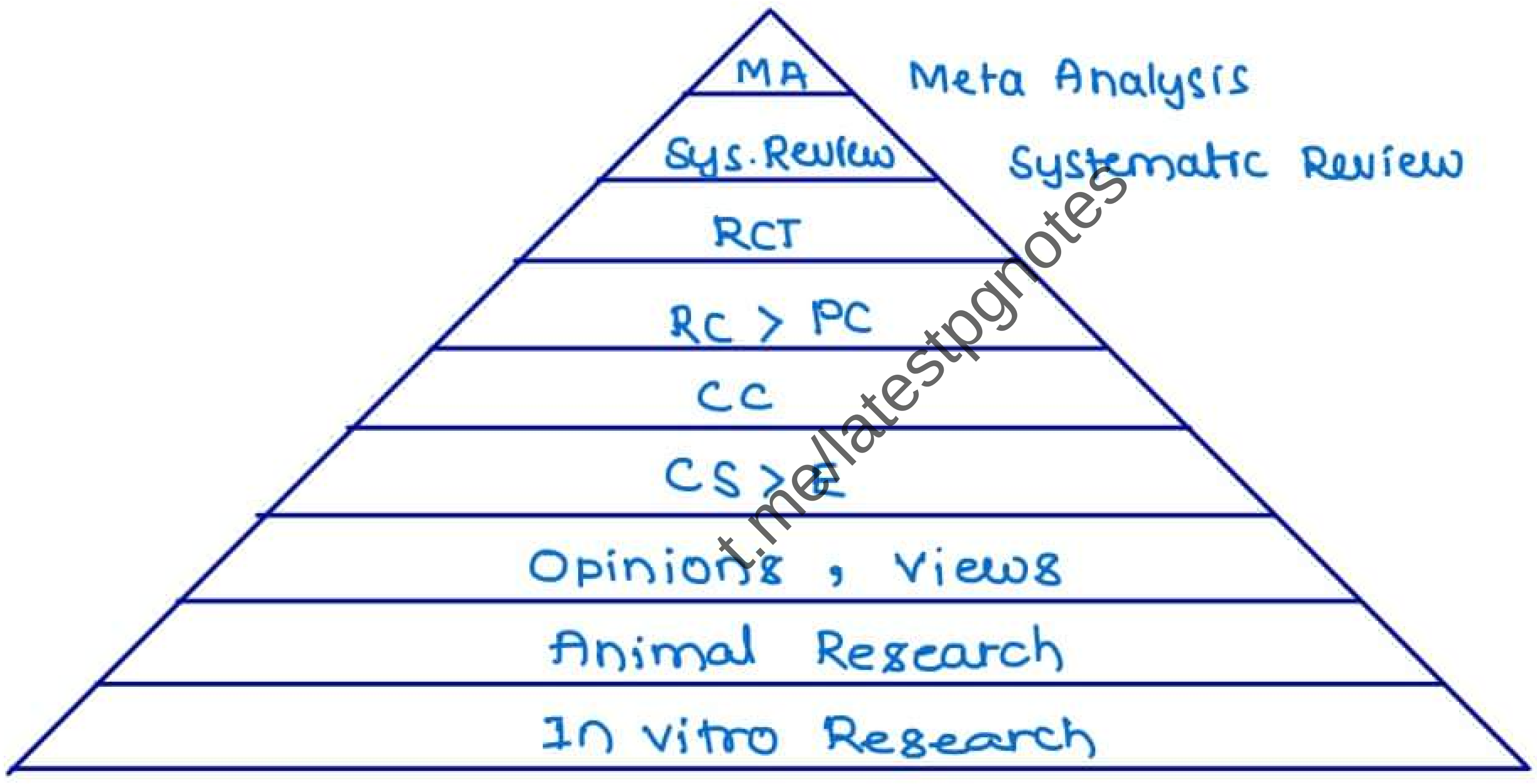
→ Analysis of AnalysES
Analysis of Multiple studies together



→ Eg. 96 Studies ⟶ Single Result

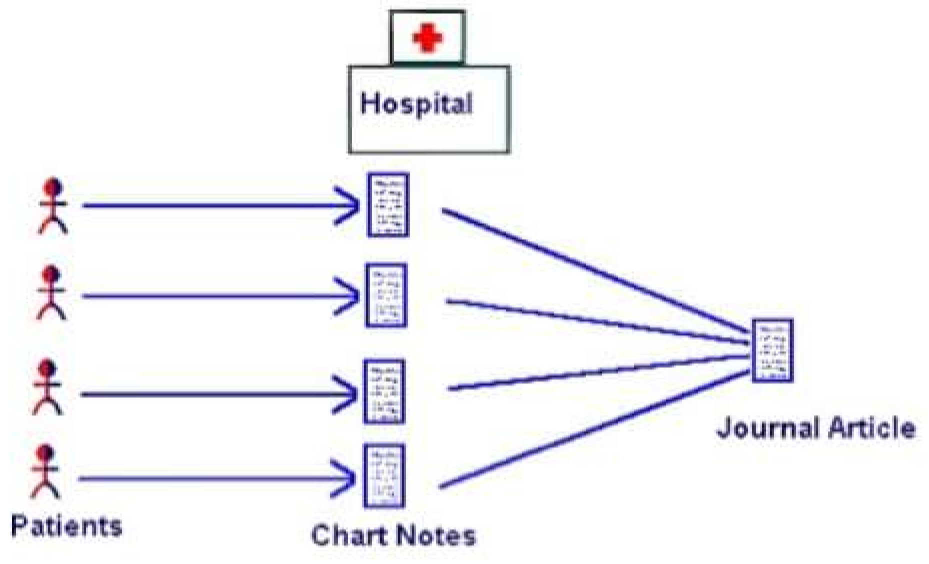
→ Meta Analysis > RCT > RCS > PC > CC > CS > E

Evidence Based Medicine [EBM]

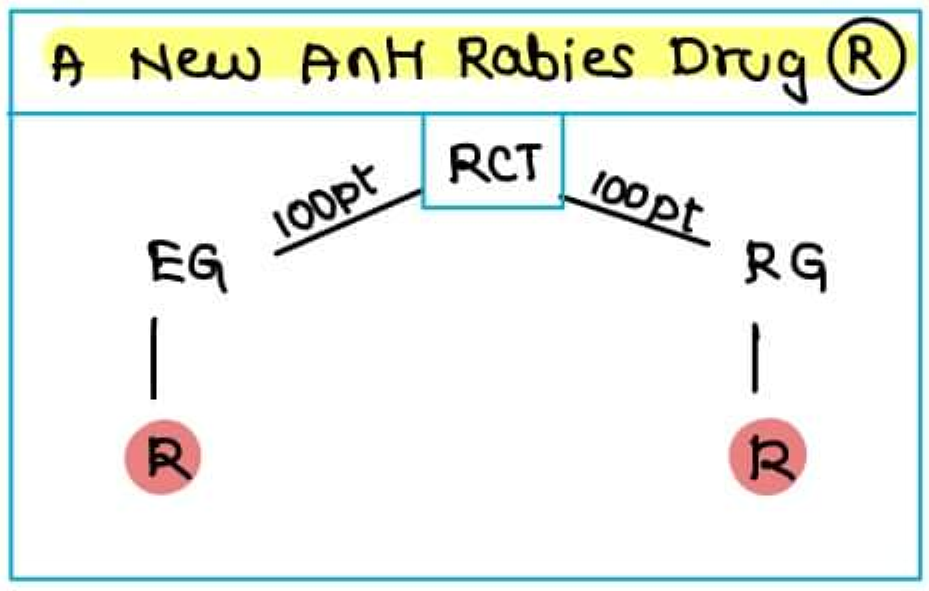


→ Top of EBM → Meta Analysis
→ Gold std for EBM → Meta Analysis
→ Father of EBM → D L SACKETT

Case Report study → Report of a single case of a disease
Case Series study → Report of a multiple cases of a disease
Pre post clinical Trial → Rabies ~ 100% fatal



Case series study



→ If the new drug R is beneficial, then all patients are benefited.

→ If it is not beneficial, no change in the out come, as rabies is ~ 100% fatal

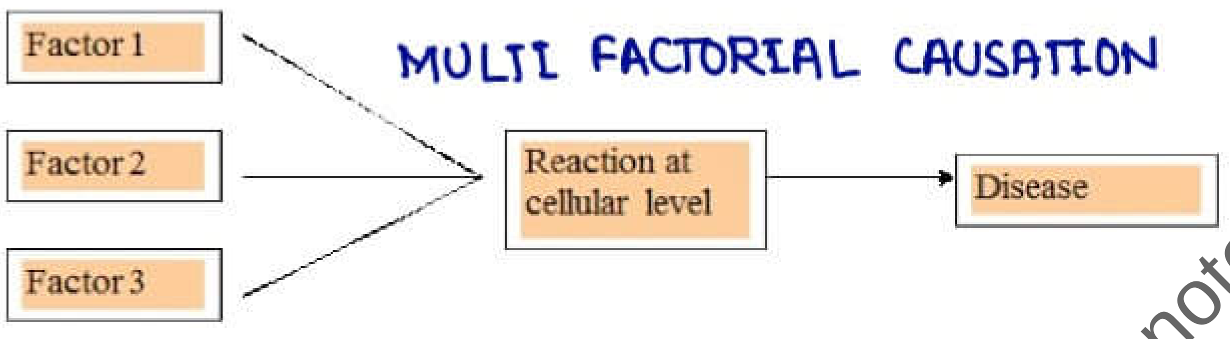
- EG will act as their own RG
  - EG – Experimental group
  - RG – Reference group

KAP studies → Used in family Planning study
Knowledge
Attitude
Practices

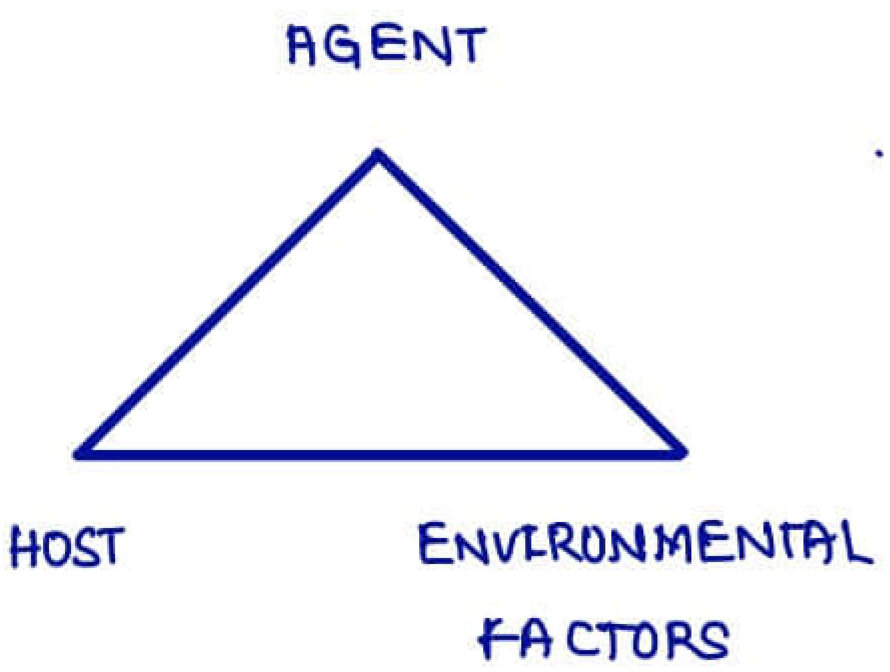
DISEASE CAUSATION, MEASUREMENTS, MILE STONES

THEORIES OF DISEASE CAUSATION

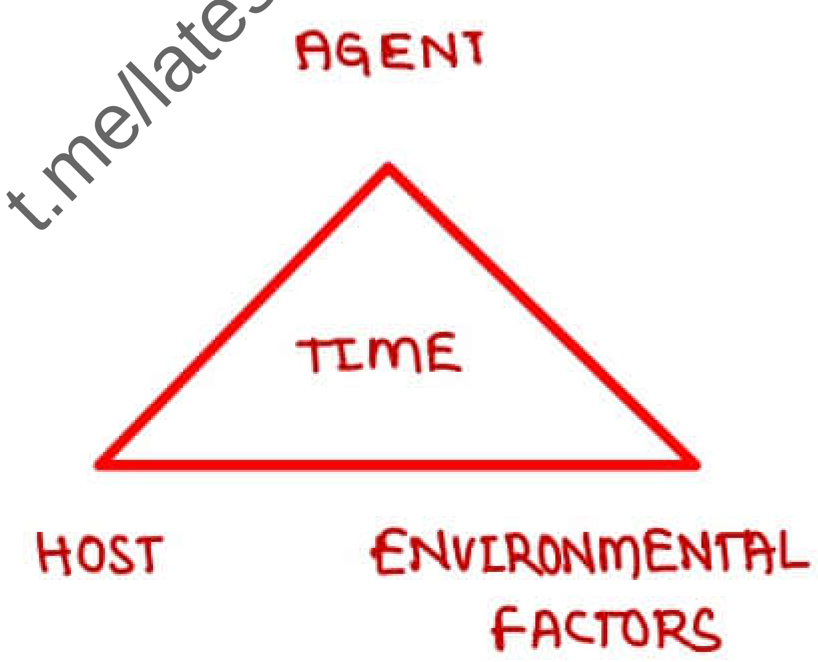
1. Theory of spontaneous Generat^n → Given by Aristotle
2. Germ Theory of Disease → by L. Pasteur
3. Multifactorial causat^n of Disease → by Pattenkoffer
4. Web of causat^n → by Mc Mohan & Pugh
5. Epidemiological Triad → Agent, Host, Environment
   Closed → interaction b/w them
6. Epidemiological Triangle → Agent, Host, Environment
   Time at centre
7. Advanced model of Epidemiological Δle → Agent is replaced by causative factors
   Not only Environmental factors, but also Nutritional, Genetic, Psychological factors required



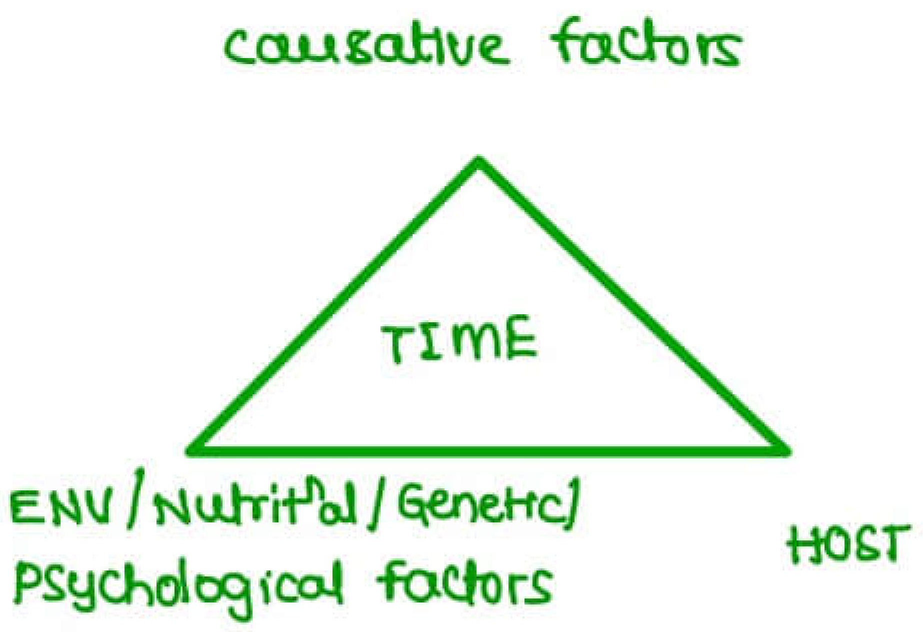
MULTI FACTORIAL CAUSATION



EPIDEMILOGICAL TRIAD

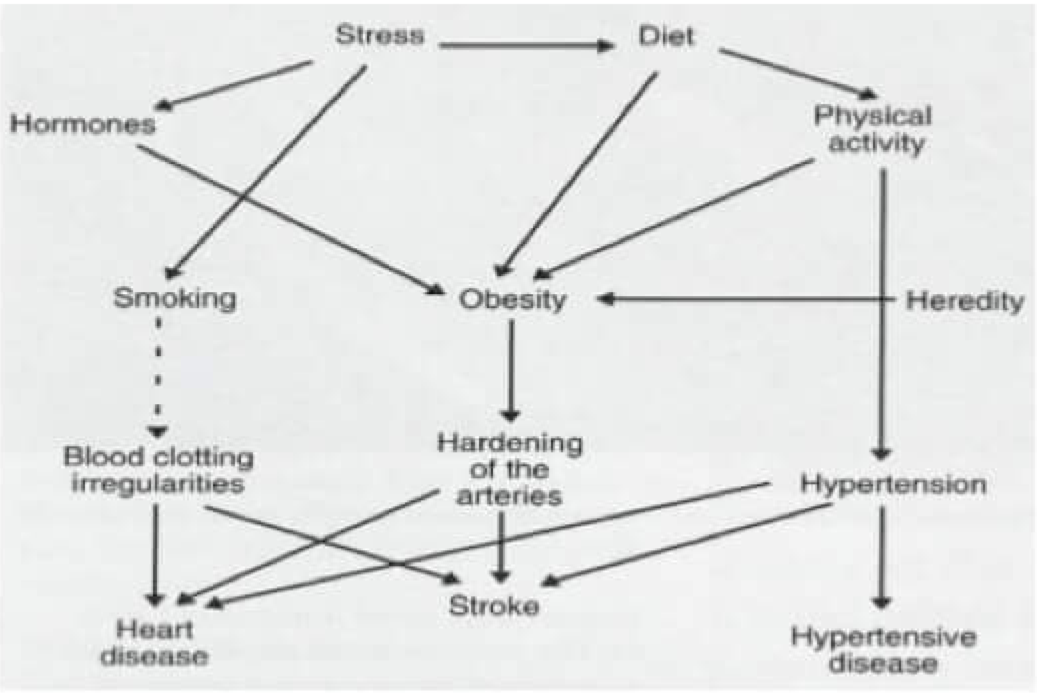


EPIDEMIOLOGICAL TRIANGLE



ADV. EPIDEM. TRIANGLE

8 BEINGS MODEL
- B Biological & Behavioral factors
- E Environmental factors
- I Immunological factors
- N Nutritional factors
- G Genetic factors
- S Social, Services & Spiritual factors



Web of causat^n

9. HILL'S criteria of Causal Association / Surgeon General's criteria

1. Temporality → cause preceeds effect
   → Best established by cohort study
   → most important criterion

2. Specificity → Diseased caused only by a particular risk factor
   → most difficult criterion to establish

3. consistency → Results must be replicable in different settings

4. Strength → RR or Odd's Ratio

5. Biological plausability → Results are scientifically rational [explainable]

6. coherence → studies must support each other's result
   - S_1 → smoking ↑ed in females
   - S_2 → smoking is a RF of Lung CA
   - S_3 → Lung CA ↑ed in females

7. Dose Response Relationship → ↑ in dose should ↑ Response

8. cessat^n of Exposure → Stoping the exposure ↓ Disease incidence

TOOLS OF MEASUREMENT IN EPIDEMICS

RATE → $\frac{a}{b} \times \begin{matrix}1000\\10000\\100000\ldots\ldots\end{matrix}$ a is part of b

RATIO → $\frac{a}{b}$ a is not a part of b

PROPORT^n → $\frac{a}{b} \times 100 = \%$ a is part of b

→ Incidence → $\frac{\text{New cases}}{\text{Total Populat}^n\text{ at risk}} \times 1000$ → Rate

→ Prevalence → $\frac{\text{New + old cases}}{\text{Total populat}^n} \times 100$ → Proportion

→ Sex Ratio → $\frac{\text{Females}}{\text{Males}} \times 1000$ → Ratio

→ 943

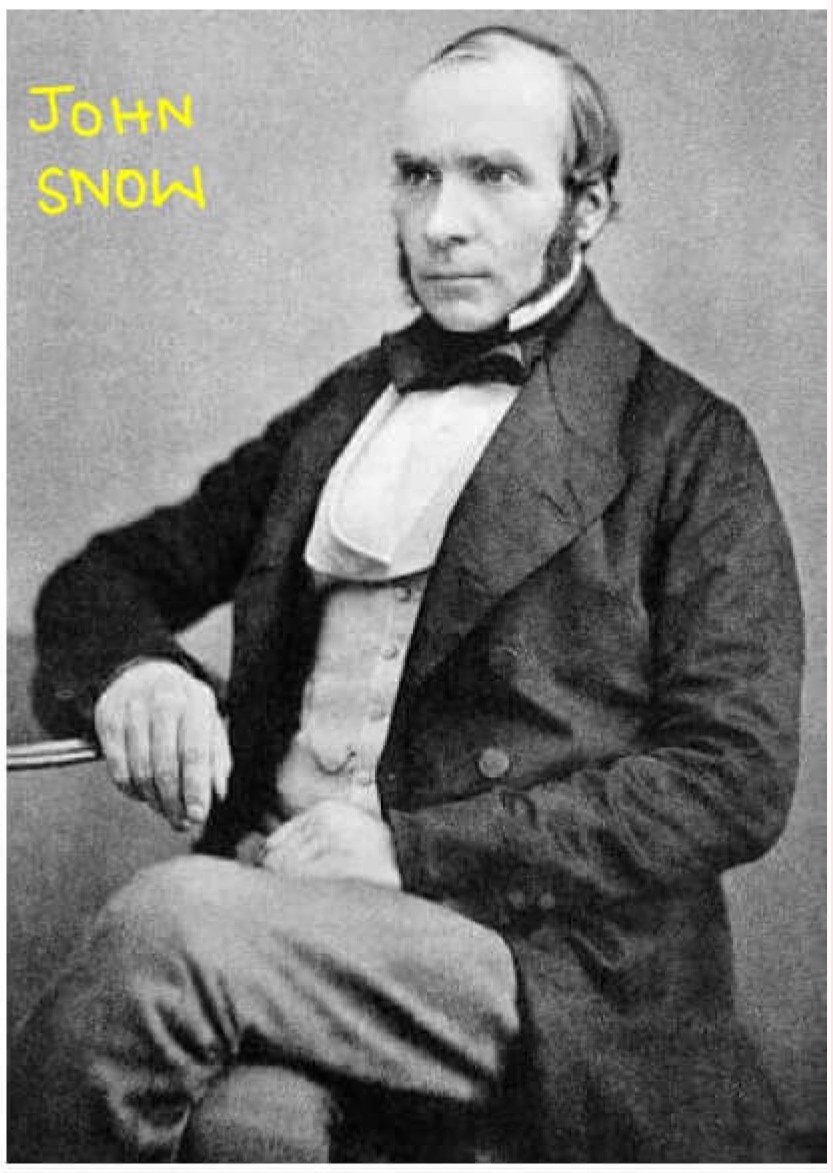
→ case fatality Rate → $\frac{\text{No. of Deaths}}{\text{No. of cases}} \times 100$ → Proportion

→ CFR of Rabies ~ 100%

CFR of JE ~ 30 – 35 %

→ IMR → $\frac{\text{No. of Infant Deaths}}{\text{Live Births}} \times 1000$ → Rate

→ MMR → $\frac{\text{No. of M. Deaths}}{\text{Live Births}} \times 1,00,000$ → Ratio



→ Father of Epidemiology → JOHN SNOW

father of modern Epidemiology → JOHN SNOW

father of Medicine → Hippocrates

First true Epidemiologist → Hippocrates

First distinguished Epidemiologist → Syndenham

Father of public health → Cholera

National Inistitute of Epidemiology → Chennai

VACCINS & COLD CHAIN

IMMUNITY

Infections ↘
vaccines → ACTIVE
formed (in body

Immunoglobulins → PASSIVE
Vertical Transmis^{n} ↗ formed outside body
[mother → child]

CLASSIFICATION OF VACCINES

LIVE
BCG
OPV
Measles
Mumps
Rubella
Y. fever
Varicella
Typhoral
JE live
H,N, live
Rotaviral

Killed
Pertussis
Rabies
IPV
Hep A
Meningococcal
KFD
JE Killed
H,N, Killed

TOXOIDS
Diphtheria
Tetanus

Combinat^{n}
MMR, MR
DPT
Pentavalent

Proteinaceous
Acellular Pertussis
Anthrax

Poly saccharide
Typhim – Vi
Pneumococcal
Meningococcal
Hib

Glycoconjugate
Pneumococcal
Meningococcal
Hib

Recombinant
Hepatitis B
HPV

NATIONAL IMMUNIZATION SCHEDULE 2017–18

→ Component of UIP [Universal Immunizat^{n} Programme] 1985 [earlier Name – Extended Programme of Immunizat^{n} [EPI], 1978]

→ UIP is a part of RCH Programme under National Health Mission [NHM]

→ Starts at Birth & completes at 16yrs of Age for boys [for girls ⊕ TT during pregnancy]
TT in pregnancy

At Birth → BCG, OPV_0, Hep B
6 weeks → DPT_1 OPV_1 $HepB_1$ HiB_1 $Rota_1$ $FIPV_1$ PCV_1
10 weeks → DPT_2 OPV_2 $HepB_2$ HiB_2 $Rota_2$
14 weeks → DPT_3 OPV_3 $HepB_3$ HiB_3 $Rota_3$ $FIPV_2$ PCV_2
9 Months → Measles 1 or MR1, Vit A [1 lakh], JE Live 1, PCV – Booster
Every 6 months → Vitamin A [2 Lac IU each] till 5 yrs
16 – 24 months → DPT_B OPV_B, Measles – 2 or MR – 2, JE Live – 2
5 years → DPT_B 10 yrs → TT 16 years → TT
[PROPOSAL → TT at 5 yrs, 10 yrs, pregnancy to be replaced by Td]

Pentavalent vaccine → DPT, Hep B, HiB by im
Total vitamin - A Dose in NIS → 17 Lac IU

No. of Doses under NIS

OPV → 5
TT → 7
BCG → 1
Diphtheria → 5
Pertussis → 5
Hep B → 3
HiB → 3
Rota Viral → 3
JE live → 2
PCV → 3
Measles → 2
MR → 2
IPV
  FIPV [Id] → 2
  Im → 1
Vitamin A → 9

DELAYED IMMUNIZATION [under NIS]

BCG → Till 1 year age
OPV → Till 5 yrs age
DPT → Till 7 yrs age
Hep B → Till 1 yr age
HIB → Till 6 yrs age
Rota Viral → Till 8 months age
Measles → Till 5 years age
JE → Till 15 years age
Vitamin A → Till 5 years age
TT → Till No limit

Pentavalent → till 1 yr age
FIPV → till 1 yr age
PCV → till 1 yr age

CONTRAINDICATIONS, AEFIS

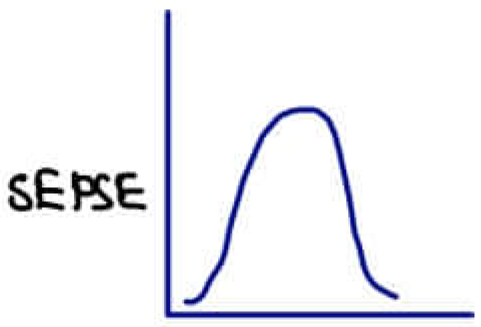
Contraindications

1 Pregnancy → All live vaccines c/I Except YF vaccine
- Attenuation → Reductn of VIRULENCE & Maintainance of ANTIGENICITY
- Pregnancy is a immunocomprimised state

2 HIV Positive → All live vaccines c/I
  Asymp. Adult → No vaccine c/I
  Symp. Adult → All live vaccines c/I except MMR, Varicella, Zoster
  Newborn → All live vaccines c/I except OPV, Measles

3 Immonosuppression → All live vaccines C/I
Corticosteroids
4. Lactatⁿ → Y. fever vaccine C/I
5 Fever → Typhoid vaccines C/I
Diarrhea → No C/I
PEM → NO C/I
Epilepsy → D P T vaccine C/I Pertussis → Active progressiv Disorder → C/I
Cerebral palsy → No C/I

6 During Epidemic → All vaccines C/I except Measles



Mumps
Rubella
Diphtheria → 2-6 Days
M. meningitis
Influenza
Food Poisoning
Typhoid → 10-14 Days
Cholera

- vaccines require 6-8 wks to form immunity
- max. IP of common epidemics is < 21 Days
- C/I in intra epidemic
- Indicated in Inter Epidemically
- Measles
  - IP - 10-14 Days
    10th Day fever starts
    14th Day rashes starts
  - IP of vaccine induced measles → 7 days
  - Post exposure vaccine must be used within 3 days of exposure

Ⓠ Measles IP Period
1. 10 Days
2. 12 Days
3. 14 Days
4. 16 Days

7. Post Disaster → All vaccines C/I
8. C/I together → Yellow fever & Cholera
Maintain a gap of 3 wks

AEFI [Adverse Event following Immunizatⁿ]
→ Observatⁿ period after administratⁿ of vaccine → 30 minutes
→ MC Vaccine Associated with
1. Paralysis → OPV
2. Hypersensitivity → Hep B > DPT
3 Shock → Hep B > DPT
4. TSS → Measles

→ MC Vaccine Associated c̄

5	GBS	→ Killed Influenza vaccine
6	Intessusceptⁿ	→ Rota viral
7	Fever	→ Pertussis [DPT]
8.	Febrile Seizures	→ Measles
9	HHE [Hypotensive Hyporesponsive Episode]	→ Pertussis
10	Persistent Inconsolable crying	→ Pertussis
11	Osteomyelitis	→ BCG
12	LAP [Lymphadenopathy]	→ BCG
13	Brachial neuritis	→ TT
14.	Thrombocytopenia	→ MMR

WalkIN COLD ROOm

WALKIN FREEZER

COLD CHAIN IN INDIA

COLD CHAIN

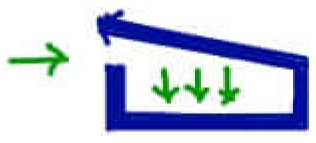
→ maintainance of temperature of all vaccines from point of Manufacture to Point of Administration

→ Temp. of cold chain → +2°c to +8°c
Except OPV [long term storage] → −15°c to −25°c
Yellow fever vaccine → −30°c to +5°c

			Duratⁿ of storage
→ State / Regional →	Walk in Cold Rooms	→ +2°c to +8°c	3 months
	Walk in freezer	→ −15°c to −25°c	
CHC / District →	Large ILR	→ +2°c to +8°c	1 months
	Large Deep freezer	→ −15°c to −25°c	
PHC →	Small ILR	→ +2°c to +8°c	1 month
	Small Deep freezer	→ −15°c to −25°c	
Sub centre →	Vaccine carrier	→ +2°c to +8°c	24−48 hrs
Village →	Ice pack	→ +2°c to +8°c	02−04 hrs

→ Lowest level of vaccine storage in India → PHC
→ max. cold chain failure occurs at → Sub centre & below

ILR [Ice lined Refrigirator]



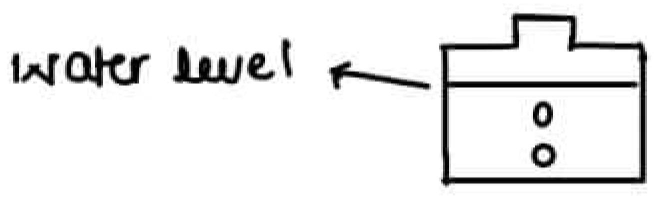
→ >8hrs of electricity / Day required
→ Cout electricity − can maintain <5 Days

Vaccine carrier

→ 4 ice packs ; 16−20 vials, upto 24−48 hrs

Ice Pack

ICE PACK



→ upto 2−4 hrs, plain tap water

REVERSE COLD CHAIN

- → part of National Polio Eliminatⁿ Programme
- → Transportatⁿ of polio stool samples at +2°c to +8°c

WARM CHAIN / KANGAROO MOTHER CARE

- → Used for Neonatal hypothermia in Low BW, pre mature New Borns

LYOPHILISED VACCINE [freeze dried vaccine]

- → available in Powder form
- →

BCG	→	Normal Saline
YF	→	Cold saline
MMR Measles	→	Distilled water / Sterile water
JE	→	Phosphate Buffer saline
HiB	→	DPT / Saline

Used c̄ in 4hrs except
YF vaccine → < ½ hr
↓
Otherwise
Toxic shock syndrome
can occur

↑

- → Reconstitutⁿ by DILUENT

VACCINES		STRAINS
BCG	→	Danish 1331 Derived from M. bovis Time required is 13 yrs [239 serial subcultures] for single dose
OPV	→	P1, P2, P3 [Bivalent P₁, P₃]
Measles	→	Edmonston Zagreb Schwarez Moraten
Mumps	→	Jeryll Lynn
Rubella	→	RA 27/3
Yellow fever	→	17 D
Varicella	→	OKA strain
JE killed	→	Nakayama, Beijing P3
JE live	→	SA - 14 - 14 - 2
H_1N_1	→	A7/California/2009
Rabies	→	fixed viral strain
Anthrax	→	Sterne strain
Typhoid	→	Ty 21a
Anti malaria	→	Litic cocktail [Spf66]
Mosquirix	→	RTS, S
Anti HIV	→	mVA [modified vaccinia ANKARA]

	BCG	OPV	DPT	Hep B	Measles	Vit A	Rabies	
DOSE ROUTE SITE	0.05 ml ID Ⓛ Deltoid	2 Drops / 1 ml Oral	0.5ml Im AL Thigh	0.5ml Im ALTHIGH	0.5ml SC Rt Arm	1ml/2ml Oral	1ml Im Deltoid	0.2ml ID multi sites

→ Strength of vit A 100,000 IU/ml — 1ml → 2ml

Nasal vaccine for H_1N_1

Rabies Vaccine Schedules

1 Post Exposure — Day 0 3 7 14 28

Im $\xrightarrow{\text{ESSEN REGIMEN}}$ 1 - 1 - 1 - 1 - 1

ID $\xrightarrow[\text{RED CROSS REG.}]{\text{THAI UPDATED}}$ 2 - 2 - 2 - 0 - 2

2 Pre Exposure

Im — Day 0 7 21/28

intradermal Injectn

Anti cervical cancer vaccines

1 Cervarix — Bivalent → HPV 16, 18

2. Gardasil — Quadrivalent → HPV 16, 18, 6, 11

→ Age group → 9 – 25 yrs

Ideal → at onset of Puberty

→ For Both Boys & Girls

3. GARDASIL 9 — Nonivalent → HPV 16, 18, 6, 11, 31, 33, 45, 52, 58

ROLL OF

AL $(OH)_3$ in DPT	→ Adjuvant [↑ antigenicity]
Thiomersal in DPT	→ Preservative
$MgCl_2$ in OPV	→ Thermostabilizing agent

EFFICACY of Single dose

BCG	→ 0 – 80% [~50%]
Measles	→ > 90%
Rubella	→ > 95% [highest]

→ First vaccine	→ Edward Jenner [small pox vaccine]
Term 'vaccine'	→ Louis Pasteur
Term 'vaccinatn'	→ Edward Jenner

Edward Jenner

1. MALARIA VACCINE MOSQUIRIX [RTS, S]

- A recombinant protein based malaria vaccine
- World's first licenced malaria vaccine
- Efficacy → 26 - 50% in infants & young children
- Preparation → Pre Erythrocytic circumsporozoite protein [CSP] of the Plasmodium falciparum malaria parasite + Envelop protein of the Hepatitis B virus [HBsAg] + Adjuvant [AS 01]

2. DENGUE VACCINE - DENGVAXIA [CYD - TDV]

- WHO endorsed world's 1st ever vaccine for Dengue fever
- Live recombinant tetravalent vaccine c̄ dilute saline, no adjuvants, no preservatives
- STRAIN → CYD - TDV
- Age group → 9 - 45 yrs age living in endemic areas
- SCHEDULE → 3 injections at 0, 6 & 12 months
- PRODUCTION OF VACCINE
  - Replacement of PrM [Pre - membrane] & E [envelop] structural genes of the yellow fever attenuated '17 D strain vaccine' c̄ those from 4 Dengue serotypes [D_1, D_2, D_3, D_4]

3. MYOBACTERIUM INDICUS PRANII [MIP] VACCINE

- made in India Leprosy vaccine to be launched
- to be given along c̄ a dose of Rifampicin
- Developed by GP Talwar [founder Director, National Institute of Immunology, Delhi]

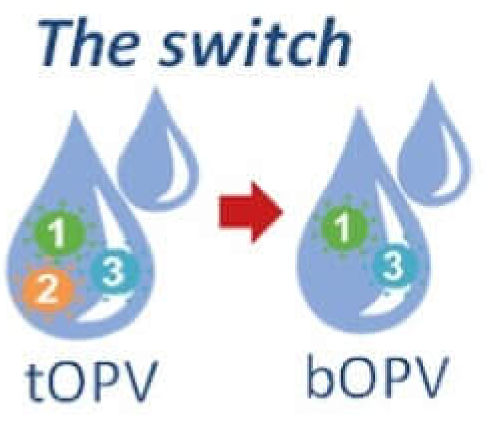
SWITCH

tOPV ⟶ bOPV

P_1 P_2 P_3 → P_1 P_3

India → 25th April 2016

Pakistan, Afganisthan, Nigeria → Polio ⊕nt



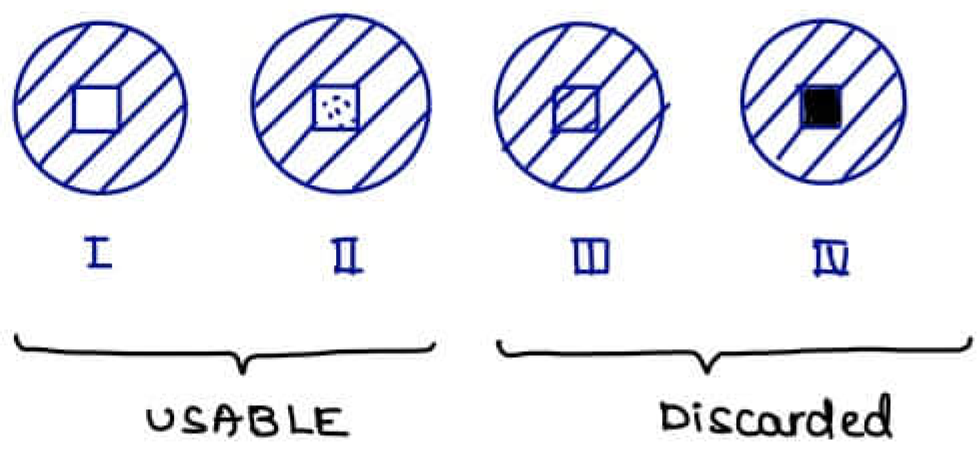
MISSION INDRADHANUSH

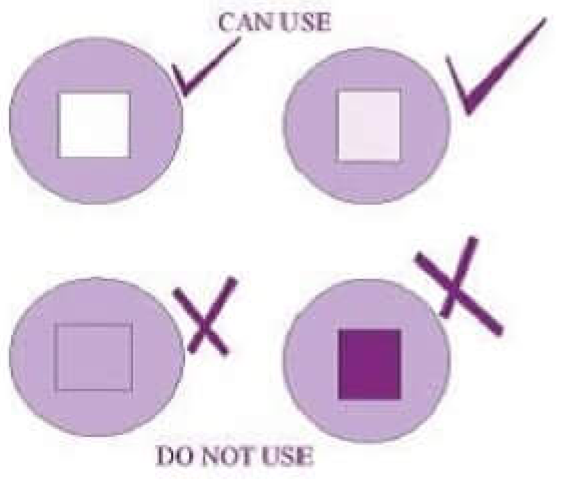
- 7 Vaccine Preventable diseases

1. TB		
2. Polio		Rota Virus
3. Diphtheria	+	MR
4 Pertussis		IPV
5 Tetanus		JE
6 Hepatitis B		
7 Measles		

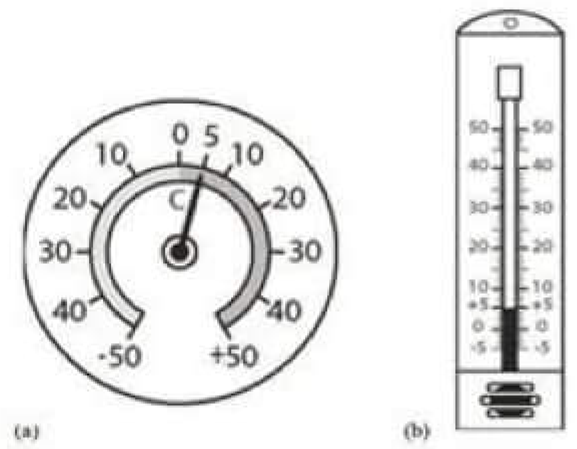
- 100% coverage by 'catchup campaigns' irrespective of previous immunizatn status by 2020

VACCINE VIAL MONITOR





- → Marker of Cold Chain maintainance of vaccine
  ~ Potency of the vaccine



DIAL THERMOMETER

- → Used for cold chain temperature monitoring
- → done twice / day
- → even a health worker can do monitoring c̄ this
- → Based on Thermo couple

PQLI, HDI, MDPI

PHYSICAL QUALITY OF LIFE INDEX

→ Index – combination of Indices

→ INDICES

① Literacy Rate

② Infant Mortality Rate

③ Life Expectancy $_{1\ year}$

→ Range → 0 < PQLI < 100

→ value for India → 65

HUMAN DEVELOPMENT INDEX

→ INDICES

① Literacy Rate / Knowledge / mean years of Schooling / Educat^n index / Enrolment Ratio
  - Mean years of Schooling [Preferred]

② Income / Income per capita / US $ PPP
  - PPP → Purchasing Power Parity

③ Life Expectancy$_{Birth}$ / LE$_0$ / Longevity at Birth

→ Range → 0 < HDI < +1

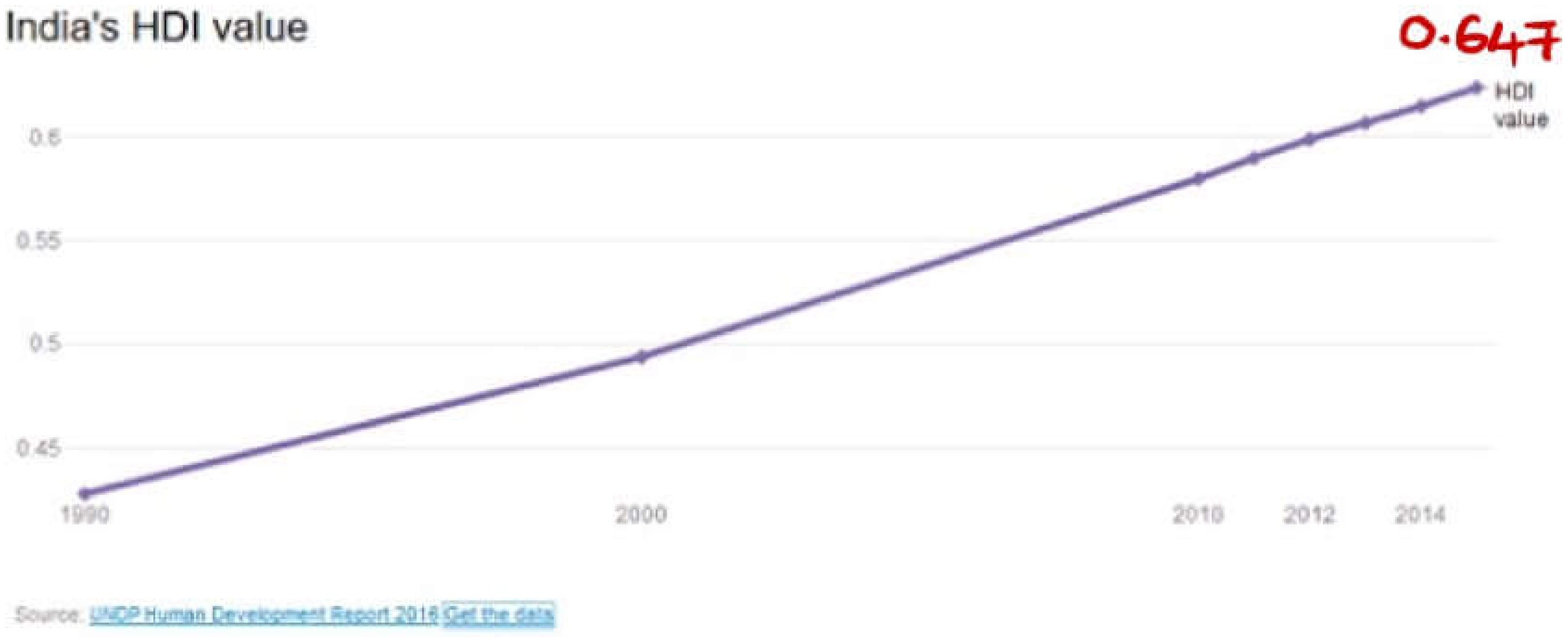
→ value for India → 0.647 [Rank – 129]
  - medium development

value for Norway → 0.9 [Rank 1]
  - most developed country

HDI CALCULATION

	MINIMUM	MAXIMUM
MYS [Mean Years of Schooling].	0	13.1
EYS [Expected Yrs of Schooling]	0	18
EDUCATION INDEX	0	0.978
INCOME [PPP]	100 $	107,721 $
LE$_{Birth}$	20yrs ★	83.4yrs ★

→ HDI is complimentary to HPI
Human Poverty Index


India's HDI value

Source: UNDP Human Development Report 2016 Get the data

HUMAN POVERTY INDEX

→ Earlier categories HPI 1 [for Developing countries]; HPI 2 [for developed countries]

→ Now → MDPI [Multi Dimensional Poverty Index]

MDPI

components

INDICATORS	SUB INDICATORS
a. Health	Child mortality Nutrition
b. Educatn	Years of schooling School attendance
c. Living Standards	Fuel Water Electricity Toilet Floor Assets

Range → 0 < MDPI < +1

INDIA → 0.121 [27.5% poor]

INTERPRETATn

20 – 33.33% → vulnerable to poverty
>33.33% → Poverty
> 50% → Severe Poverty

Overall → Deprivatn in > 1/3 is POVERTY

BPI [Below Poverty Line]

1. Coloric Intake

– Rural → < 2400 K.cal / Day ★
– Urban → < 2100 K.cal / Day ★

2. Income Per Capita

	Tendulkar committee 2011-12	Rangarajan committe 2013-14
– Rural	< 27/- per day	<32/- per day
– urban	< 33/- per day	<47/- per day
	– 22% BPL	– 29.5% BPL

3. Income Per capita [World Bank]

→ Extreme Poverty < US $ 1.90 per Day
Moderate Poverty < US $ 3.10 per Day

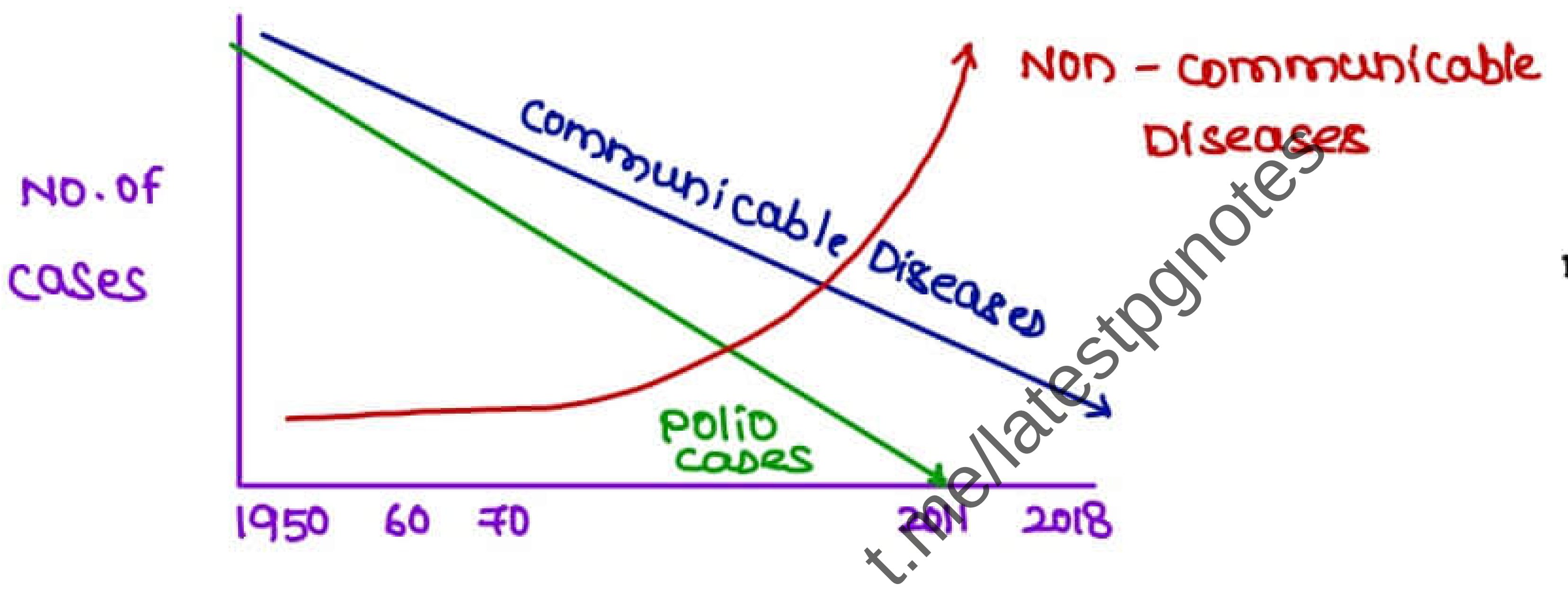
TIME DISTRIBUTION, EPIDEMICS

TIME DISTRIBUTION OF DISEASE

I. Short term fluctuations [Days - weeks - months] → EPIDEMIC
II Long term fluctuations [Decades] → SECULAR TREND [slow rise or slow fall]
III Periodic fluctuations [Repeatedly]
  → Seasonal Trend → ↑ or ↓ in a particular season
  → Cyclical Trend → ↑ or ↓ in a populatⁿ after a gap of every few years.

→ Food poisoning → Epidemic
Bhopal Gas Tragedy → Epidemic ; Methy Iso cyanide exposure on 3-12-1984
Chernobyl Tragedy → Epidemic ; Cesium [Cs], Iodine [I_2] & Strontium [Sr] exposure on 26-04-1986

→

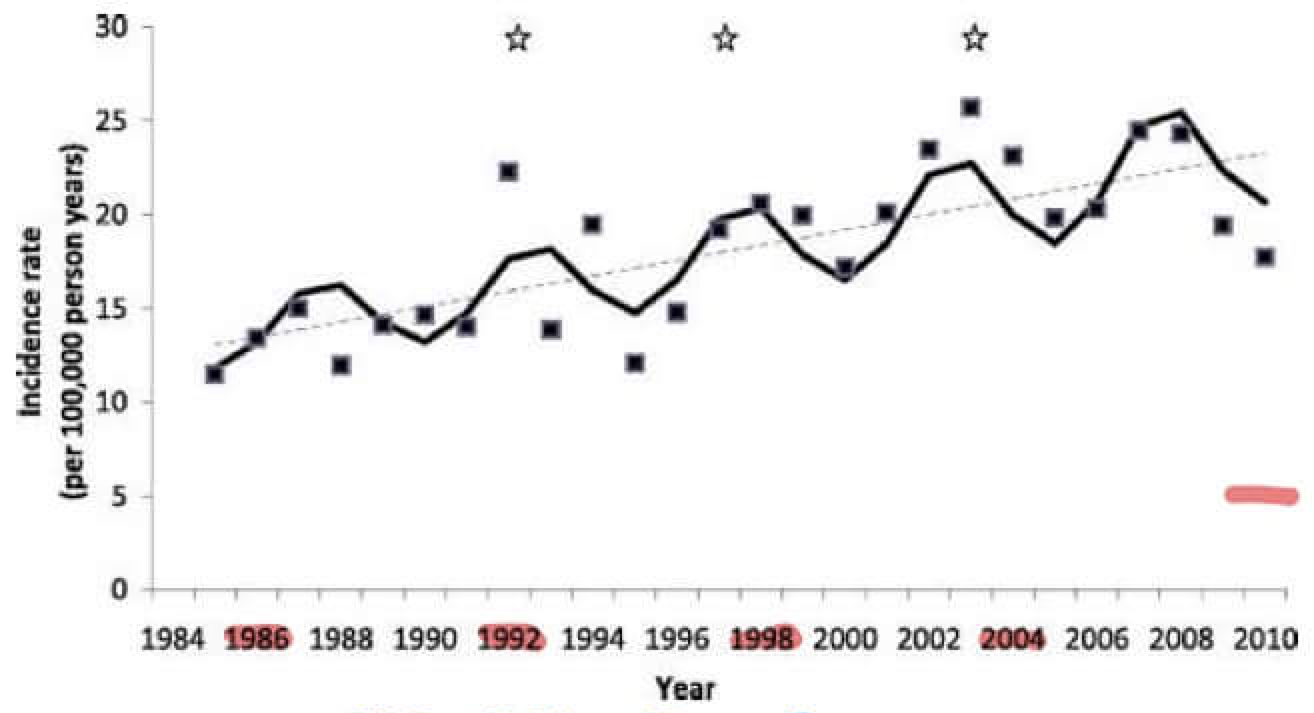


⟹ SECULAR TREND

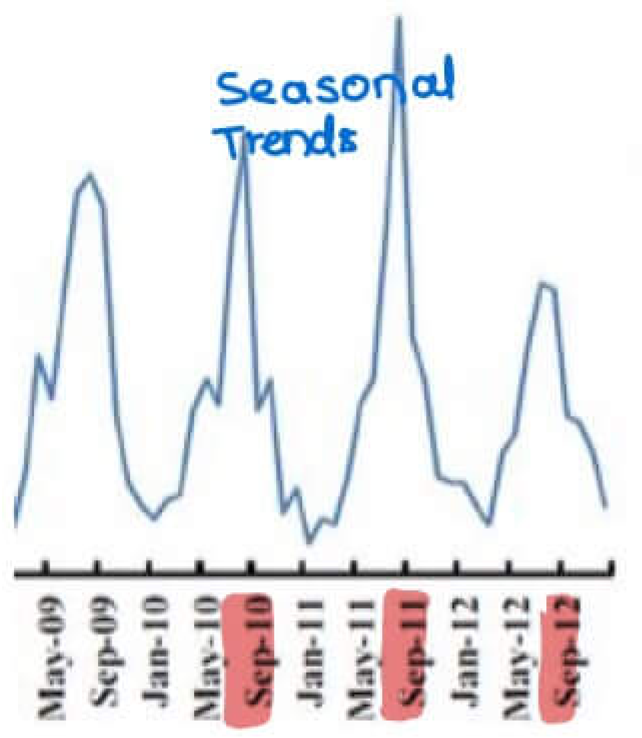
→ SEASONAL TREND → Malaria, Dengue in Rainy Seasons
→ Respiratory infectⁿ in winter Seasons
→ Heat stroke in Summer

→ CYCLICAL TREND → Measles → once / 2-3yrs
Rubella → once / 6-8 yrs
Influenza show max. cyclical trend b/c of

Max. Antigenic variatⁿ
→ Drift [d/t point mutations]
→ Shift [d/t genetic ReAssortments]

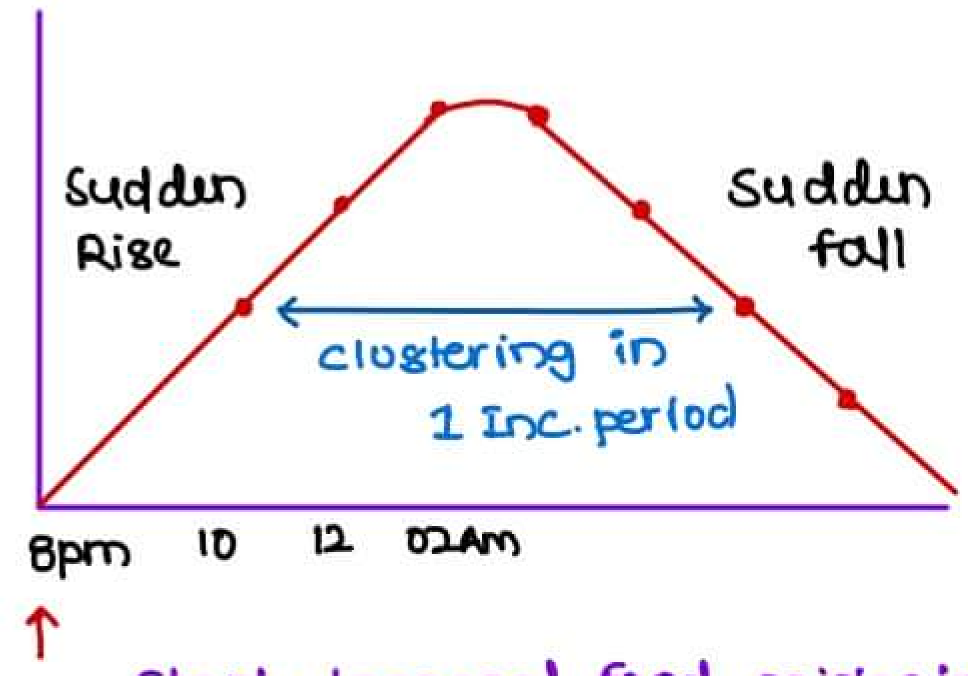


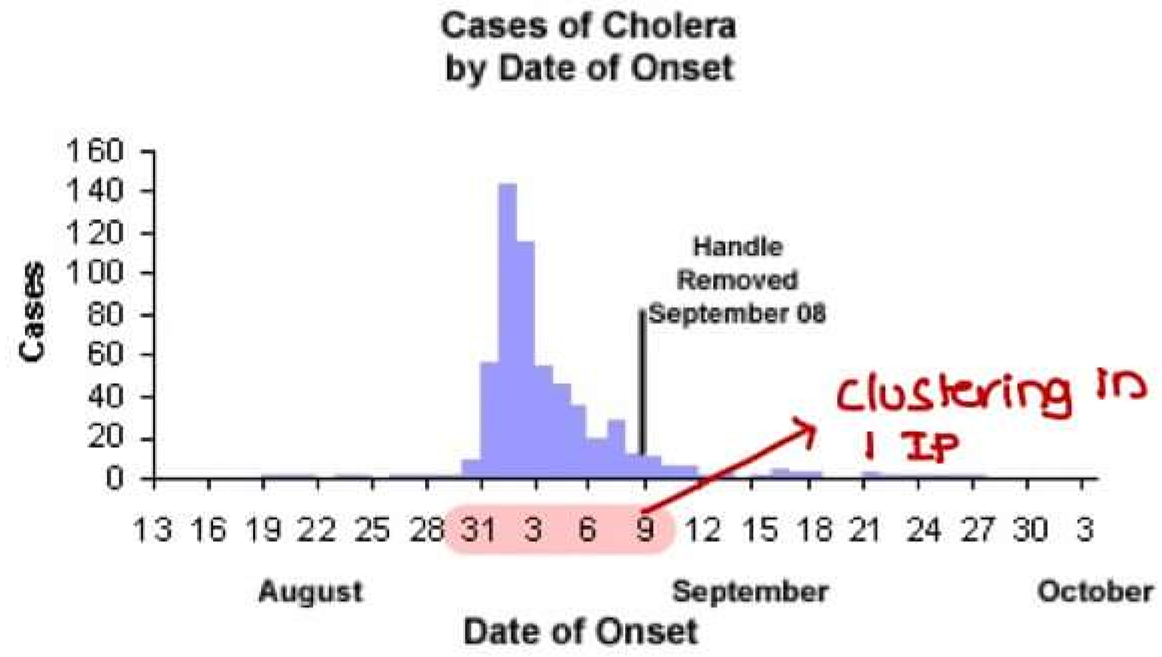
CYCLICAL TREND



TYPES OF EPIDEMICS

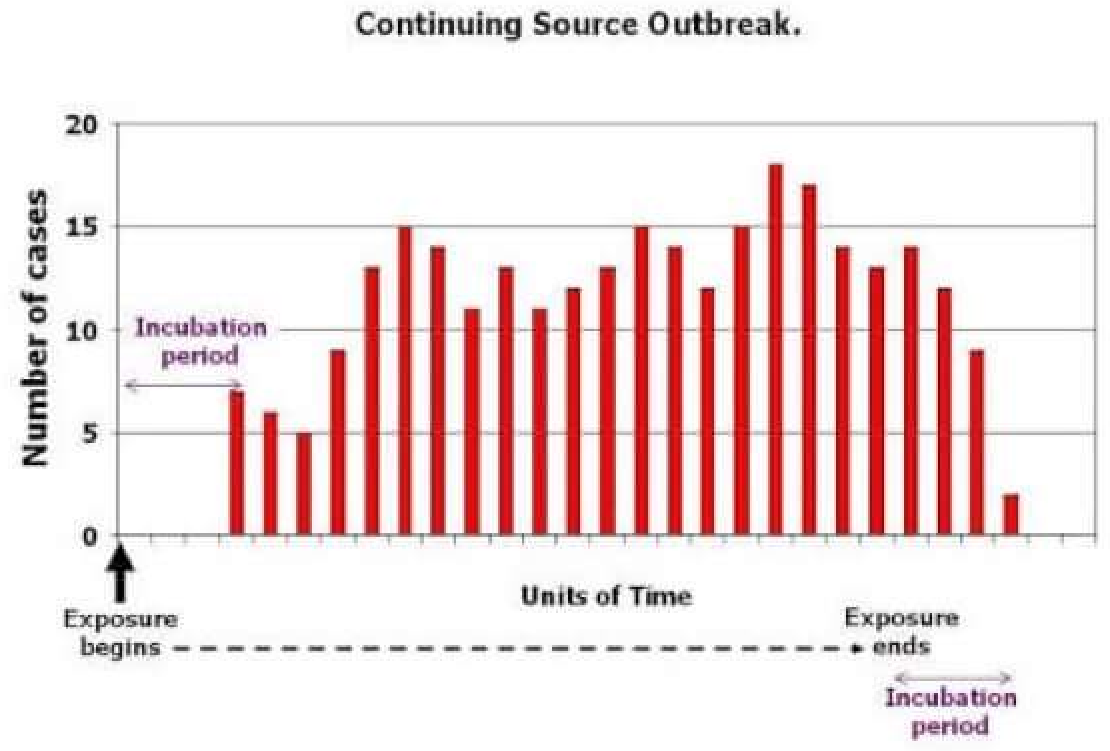
I Single Exposure, Point Source Epidemics

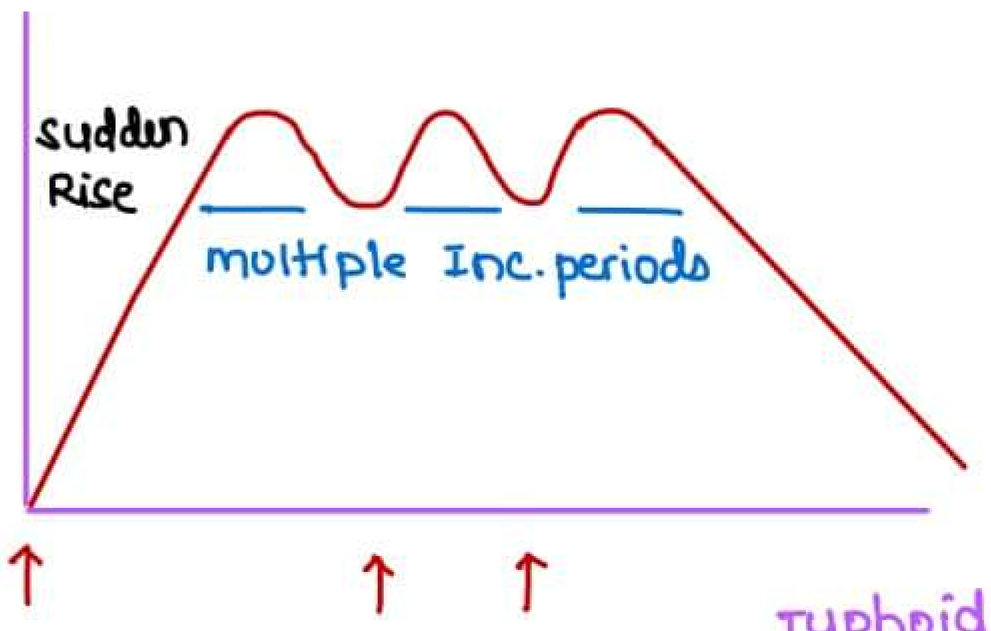




Staphylococcal food poisioning [IP → 1-6 hrs]

II Multiple Exposure, Point source Epidemics



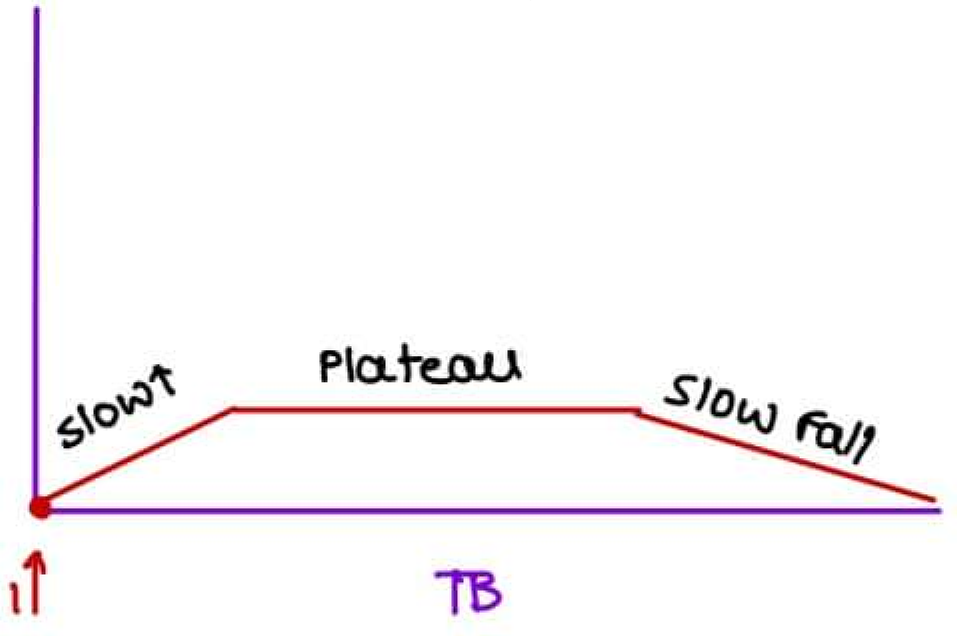


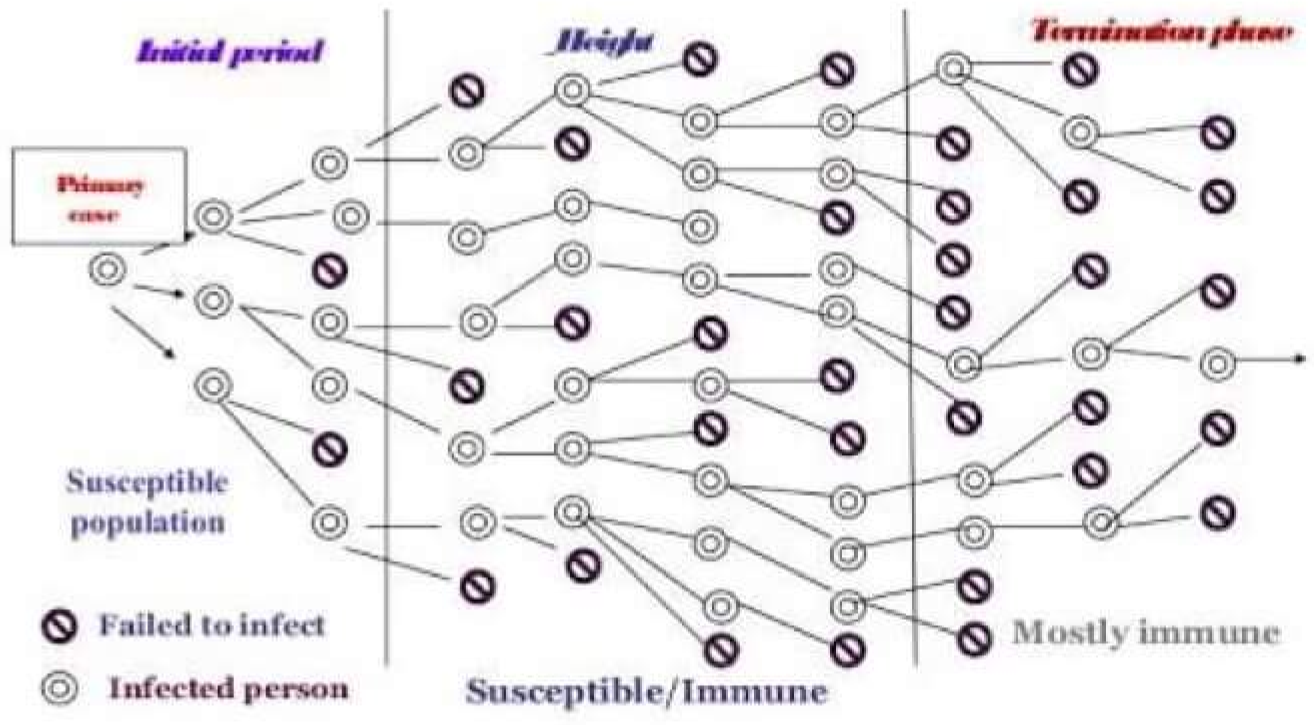
Contaminated well

Typhoid → IP → 10 - 14 Days

- multiple peaks are known as SECONDARY WAVES

III Propagated Epidemics





→ 1case of TB not on Rx can give rise to 10-15 cases/years [not more cases d/t sub clinical immunity]

→ only shown by diseases which have PERSON - PERSON TRANSMISSION

→ may show SECONDARY WAVES some times.

→ BGT [Bhopal Gas Tragedy] → Single Exposure Point source Epidemic

CT [Chernobyl Tragedy] → Single Exposure point source Epidemic

HIV / STD → Propagated Epidemic [Person - Person Transmisⁿ]

HIV/STD [commercial sex workers] → Multiple Exposure Point Source Epidemic

Polio [if in India Now] → Propagated Epidemic

EPIDEMIC

→ No. of cases of a disease clearly in excess of normal expectancy

- 2017 → 4900 cases
  2019 → 5600 cases
  2020 → 4900 cases

} → 2018 → 15000 cases → EPIDEMIC

Normal Expectancy of Polio in India → 0
if 1 case reported → Epidemic

→ No. of cases of Disease > Mean + 2 SD → Epidemic

- Mean → 5000 cases / yr
  SD → 800 cases / yr
  Epidemic → 5000 + (2)(800) → > 6600 cases / year

→ New Disease occurence is EPIDEMIC

→ Reoccurence of Disease is EPIDEMIC

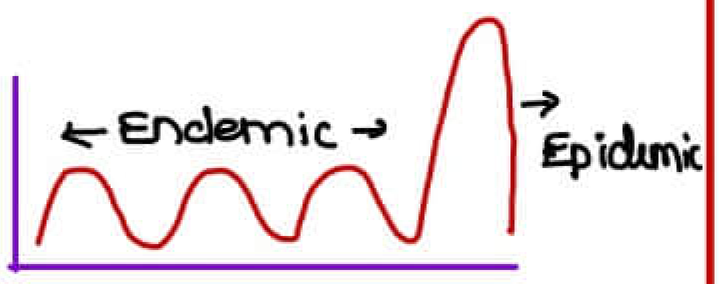
ENDEMIC

→ "Constant or continuous presence" of a disease in a populatn

→ Endemic Diseases in India

- Measles, Mumps, Rubella, Chicken Pox, Pertussis
  TB, HIV, Cancers, Diabetes, HTN, CHD

→ Epidemics can arise from Endemics also

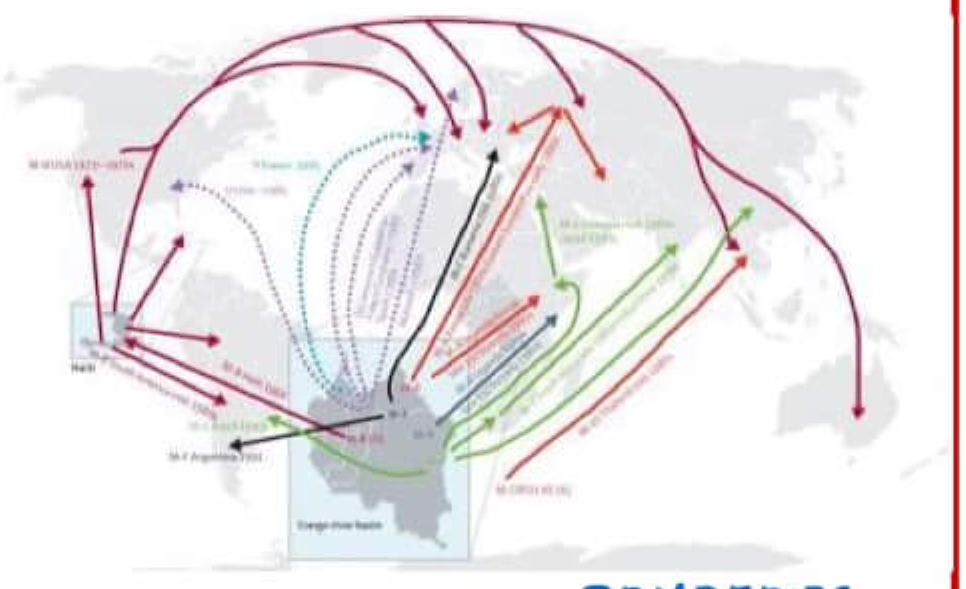


PANDEMIC

→ Country - to - country Spread

→ Eg.

- H_1N_1 [Swine flu]
  H_5N_1 [Bird flu]
  HIV [Largest Pandemic]
  Ebola
  Zika
  H_7N_9 [Next possible Pandemic]



PANDEMIC

SPORADIC

→ Scattering of Cases in Time, person

→ Eg

- Arsenic poisoning
- Snake Bite

Disease showing Epidemic, Endemic, Pandemic & Sporadic → INFLUENZA [H_1N_1, H_5N_1]

ELIMINATION, ERADICATION, SURVEILLANCE

CONTROL

- → Reduct^n of transmission to such a low level that it stops to be public health problem
- → ↓ Incidence , ↓ Durat^n, ↓ Financial Burden , ↓ Complications

ELIMINATION

- → complete interrupt^n of transmission but Organism still present
- → Regional [country] term
- → In INDIA
  1. Gunie worm [Dracanculiasis] → Feb 2000
  2. Leprosy → Dec 2005
  3. Maternal Tetanus , Neonatal Tetanus → July 2016
  4. Yaws → July 2016

Gunie worm

- → Eliminat^n level for leprosy → <1case/10,000 populat^n
  Eliminat^n level for NNT → < 0.1 case | 1000 Live Births

ERADICATION

- → complete exterminat^n of Organism
- → Global term
- → All or None phenomenon + nt
- → Eradicated Diseases globally
  1. SMALL POX [8th May 1980] – only disease eradicated until now
     – last case reported in 1977 in Somalia
  2. POLIO virus Type 2 on 20th September 2015
  3. Rinderpest [Cattle Disease]

DISEASE FREE STATUS

- → Polio → 27 – 03 – 2014
- → Trachoma → 08 – 12 – 2017

Candidate / Potential / Target Disease

Eliminat^n [India] → POLIO
Eradicat^n [World] → POLIO

MONITORING → Analysis of performance of routine measurement

SURVEILLANCE → Ongoing systematic process of [all factors affecting a disease] data collect^n, compilat^n, analysis & interpretation and its applicat^n

MONITORING	SURVEILLANCE
→ continuous overlooking progress of Health activity	→ continuous scrutiny of all factors affecting a disease c̄ attension, authority & suspicion.
→ No inbult act^n component	→ Inbuilt act^n component is present
→ No feedback	→ feedback is inbuilt
→ One time linear process	→ cyclical continuous process
→ Smaller concept	→ Broader concept

TYPES OF SURVEILLANCE

1. Passive → Patient reports to Health system on his own [90%]
2. Active → Health System goes to Community in search of cases [8-10%]
   → seen in 4 NHPs of malaria by MPW [M] once/fortnight
   Polio by SMO [Surveillance MO] as part of AFP Surveillance
   TB by ASHA | TB supervisor
   Kala Azar by House to House visit
3. Sentinel → Used to identify missed / Hidden cases
   Seen in NHPs of HIV [in blood back, Anti Natal clinic, STD clinic]

LEVELS OF PREVENTION OF DISEASE

		MODES
PRIMORDIAL	→ before the emergency of Risk factors	→ Health Educat^n
PRIMARY	→ Risk factor present But no disease yet	→ Health promot^n Specific protect^n
SECONDARY	→ Disease possibly started in the body	→ Early diagnosis & Treatment
TERTIARY	→ Disease in progression/over	→ Diability limitat^n Rehabilitat^n

→ Primary can prevent the Disease/outcome
Secondary can not prevent the Disease | outcome

EXAMPLES

→ Measles vaccines administered at 9 months of age
- at 9 months maternal antibodies are absent → Risk factor for measles
- vaccinat^n → specific protect^n
- Primary level of preventⁿ

→ Tetanous Toxoid
- Injury [Risk factor] present
- specific protect^n for Tetanus

} Primary

→ Hepatitis B vaccine for medical professionals
  - Risk is present
  - Specific protect^{n} } Primary

→ Rabies [post exposure] vaccine
  - Risk factor present
  Specific protect^{n} } Primary

Rabies [Pre exposure] vaccine
  - Risk factor is present
  Specific protect^{n} } Primary

→ All vaccines including BCG vaccinat^{n} by default comes under PRIMARY Prevent^{n}.
Except,
When BCG is used for ℞ of Bladder Cancer → SECONDARY Prevent^{n}

→ condoms [HIV] → PRIMARY
  - Risk factor [HIV/STD]
  - specific protect^{n}

condomes [pregnancy (outcome)] → PRIMARY

→ combined OCPs
IUDS
sterilizat^{n} → PRIMARY

→ Majority of contraceptive methods by default comes under PRIMARY PREVENT^{n}
Except in situations like
  - combined ocps in PCOD → SECONDARY [℞]

→ Sputum smear Examinat^{n} for AFB → SECONDARY [Diagnostic]
→ CXR for Pneumonia → SECONDARY [Diagnostic]
→ Peripheral blood smear Ex. for malaria → SECONDARY [Diagnostic]
→ Blood culture in Typhoid → SECONDARY [Diagnostic]
→ Pap smear [Screening Test] → SECONDARY [Early detect^{n} → Dx]

→ All screenings/All Diagnostic tests by default are SECONDARY Level Prevent^{n}

→ DOTS for TB → SECONDARY [℞]
→ MDT for leprosy → SECONDARY [℞]
→ ACT for malaria → SECONDARY [℞]

→ DOC for malaria chemo Prophylaxis → Doxy or mefloquine → PRIMARY [specific protect^{n}]

→ crutches in Polio → TERTIARY [Locomotory Rehabilitat^n]
Physiotherapy in Polio → TERTIARY [Disability Limitat^n & Rehabilitat^n]
→ Spectacles → TERTIARY [Disability Limitat^n & Rehabilitat^n]

→ IOC for cataract → SECONDARY [R_x]
LASIK → SECONDARY [R_x]

→ Mosquito nets → PRIMARY [specific protect^n]
Mosquito repellets → PRIMARY [specific protect^n]
DDT → PRIMARY [specific protect^n]
Gambusia → PRIMARY [specific protect^n]

→ Source reduct^n for mosquitoes → PRIMORDIAL

→ father asked his son,
- not to adopt bad habits → PRIMORDIAL
- leave his bad habits → PRIMARY [Health promot^n]
- son leaves bad habits on advice of father → PRIMARY [Specific prevent^n]

→ Preserving Traditional lifestyle → PRIMORDIAL
changing life style → PRIMARY

→ Fetal USG → SECONDARY [early D_x]
IFA Pregnancy → PRIMARY [specific protect^n]
Folic Acid 3 months before concept^n → PRIMARY [Specific protect^n]
mobile eye clinic → SECONDARY [early D_x]
Seat belt / Helmet → PRIMARY [Specific protect^n]
Monitoring OF BP → SECONDARY [early D_x]

→ Best level OF Prevent^n → Primordial
Best level for NCD [Non Comm. Dz] → Primordial
Best level for TB → Secondary
Best level For Leprosy → Secondary

ICD - 10 [International classificat^n of Diseases]

→ 10th edition
→ Revised every 10 years
→ 3 volumes
  — I - Classificat^n
  — II - Instruct^n manual
  — III - Alphabetical Index
→ 22 chapters

→ ICD - 10 - CM [Clinical Modificat^n] → 5 volumes, 21 chapters

→ unknown etiology of a disease → 'U' chapter or 'R' chapter finally

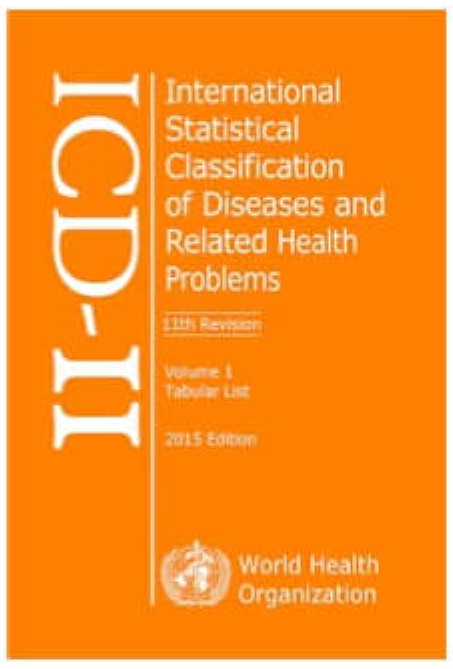
→ Psychiatric disease → 'F' chapter

ICD - 11 [2018]

→ 3 volumes

- I - Tabular list
- II - Reference guide
- III - alphabetical index

→ chapter 26 and V, X


ICD-11
International Statistical Classification of Diseases and Related Health Problems
11th Revision
Volume 1
Tabular List
2015 Edition
World Health Organization

SPECTRUM OF A DISEASE

Disease

Impairment → loss of any anatomical / physiological / psychological funct^n

Disability → unable to perform Routine activity [according to age & Sex]

Handicap → unable to fulfil social Role

RTA [Road Traffic Accident] → Disease ← Diabetes

Loss of Hand → Impairment ← Erectile Dysfunct^n

Can not DRIVE → Disability ← No sexual Activity

unemployment → Handicap ← Divorce

CASES

Primary case → first case of a Disease

Secondary cases → All cases who develops from primary case

Index case → first case that 'comes to notice of Investigator' [primary/sec]

Incubation Period → Time interval between Entry of organism till 1st sign/symptom

Median IP → Time taken for 50% cases to occur

Serial Interval → Interval/gap b/w primary & secondary case

Generat^n Time → Time gap b/w Entry of organism till max. infectivity

Latent Period → Time period b/w onset till first detect^n
Corresponding term to IP for non communicable diseases

CARRIERS

Contact → carrier who develops infect^n from a case

Paradoxical → develops infect^n from another carrier

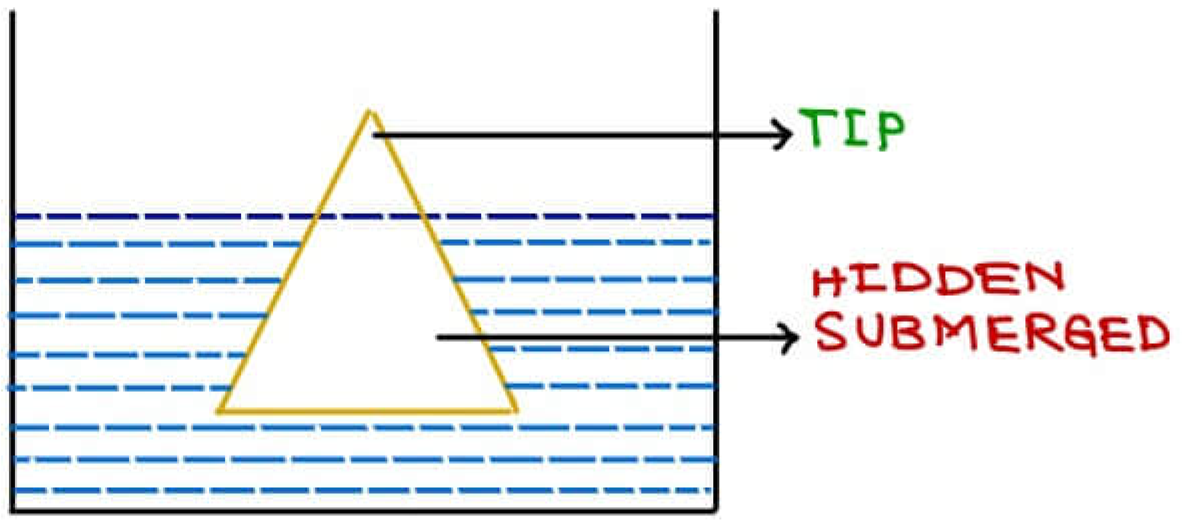
Chronic → carrier who sheds > 6 months

Incubatory → sheds organism even in IP

Convalscent → sheds organism even in Recovery

Pseudo → carrier of avirulent organisms

ICEBERG PHENOMENON



- → Tip
  - → clinical cases } Apparent cases
  - → Diagnostic tests used
  - → Secondary level of preventⁿ
- → Hidden/submerged
  - → Carriers latent
    Preclinical Subclinical } InApparent cases
  - → Screening is used
  - → Secondary level of preventⁿ
- → Line of Demarcatⁿ
  - → lies between Inapparent & Apparent cases
- → No carriers
  - → No Iceberg Phenomenon
    - Measles Tetanus
      Rubella Pertussis
      Rabies
- → Ice berg phenomenon is a Dynamic phenomenon [Keeps on changing]

STANDARD OF LIVING

→ Depends on

H	Housing	H	Health
I	Income	E	Educatⁿ
S	Sanitatⁿ	R	Recreatⁿ
O	Occupatⁿ	O	Others
N	Nutritⁿ		

SOCIO ECONOMIC INDICATORS

He	Housing
Fl	Family Size
A	Available per capita calorie
G	Growth Rate
G	GNP
E	unEmployment
D	Dependency Ratio

CFR [case fatality Rate]

→ $\frac{\text{Deaths}}{\text{Cases}} \times 100$

→ Proport^{n}

→ $\text{CFR}_{\text{JE [Japanese Encephalitis]}}$ → 35%.

→ measure of virulence of organism [Killing power]

→ Limitat^{n}
  - only for acute Diseases
  - Time interval not specified

SULLIVAN'S INDEX

→ DFLE – Disability free Life Expectancy

DALY

→ Disability Adjusted Life year

→ years lost d/t disability or pre mature death of a person

→ Best indicator of Disease burden in a community

INCIDENCE

→ $\frac{\text{No. of New cases}}{\text{Total populat}^{n}\text{ at risk}} \times 1000$

→ Rate

PREVALENCE

→ $\frac{\text{No. of New + Old cases}}{\text{Total populat}^{n}} \times 100$

→ proport^{n}

→ always expressed in percentage

→ Prevalence = Incidence × Mean durat^{n} of Disease

Ⓠ A New Drug does not cure but reduces Complications & death. What will happen to incidence & Prevalence

→ Incidence → same
Durat^{n} → ↑ses
prevalence → ↑ses.

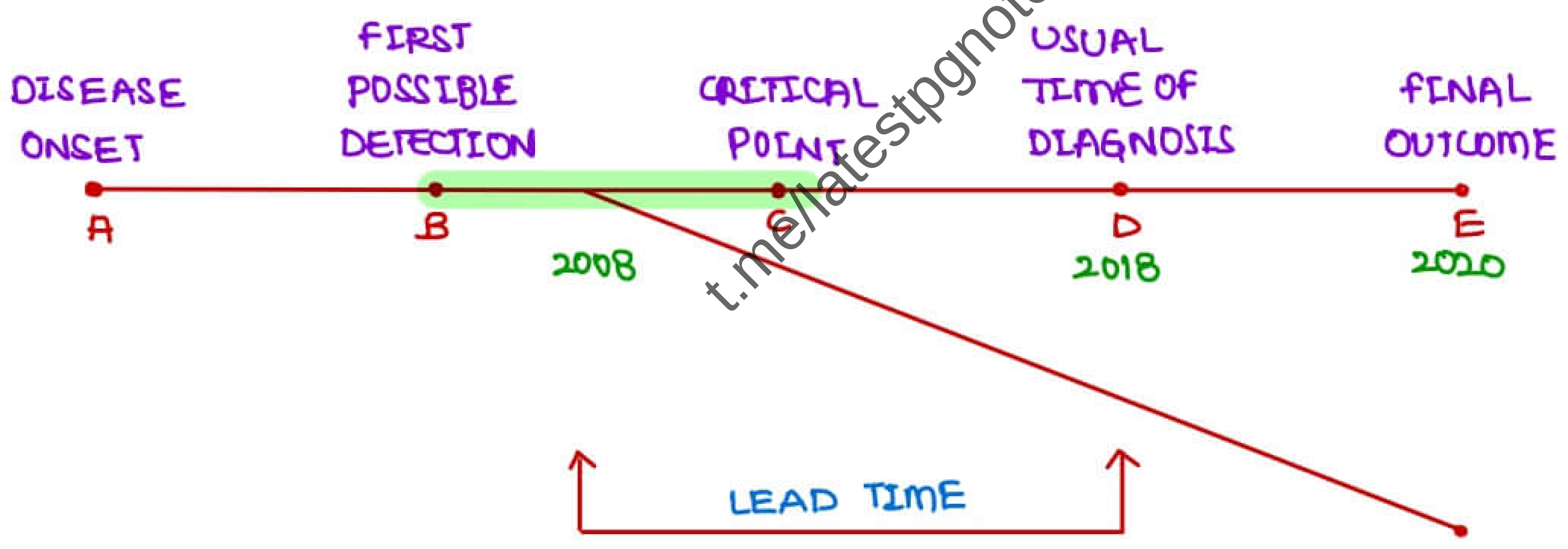
SCREENING OF DISEASE

DEFINITIONS

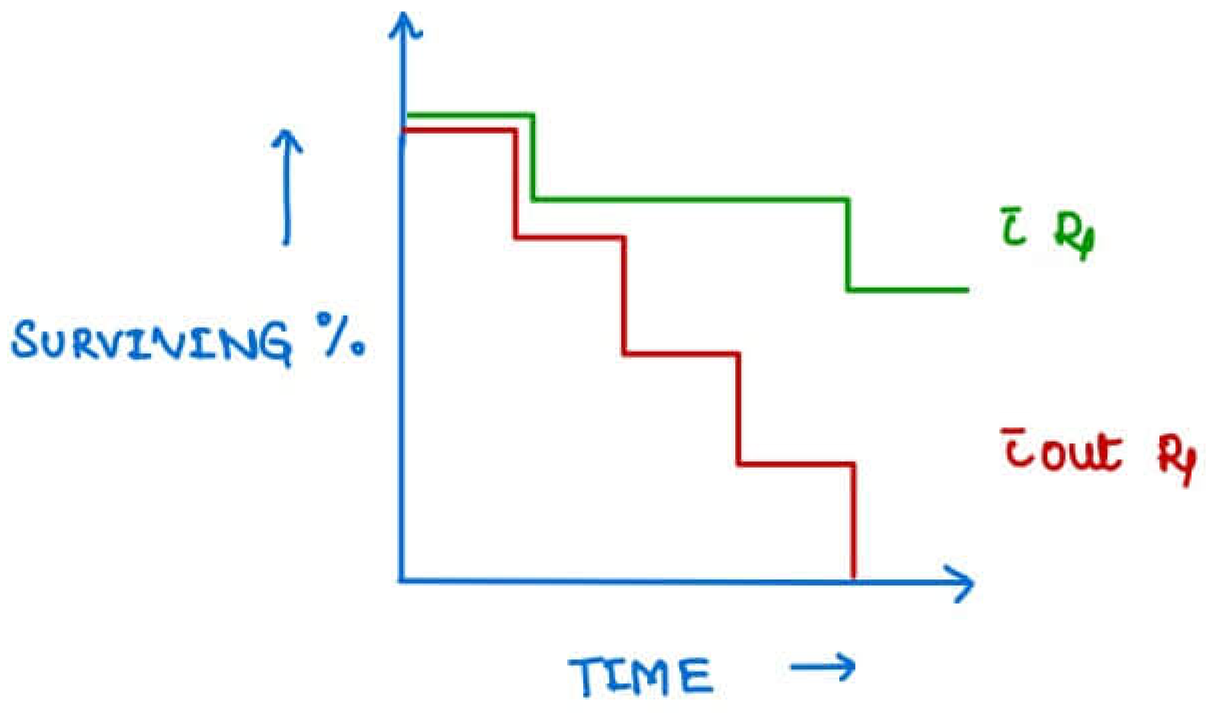
Screening → search for an UNRECOGNISED Disease or Defect in APPARENT HEALTHY by means of RAPIDLY APPLIED TESTS

	SCREENING	DIAGNOSIS
DONE ON	→ Apparently healthy	→ cases
APPLIED ON	→ Populations	→ Individuals
TEST RESULT	→ Final	→ Not Final
BASED ON	→ one criteria	→ Signs/symptoms, C/F
COST	→ cheaper	→ expensive
TIME	→ faster	→ Time consuming
ACCURACY	→ Inaccurate	→ Accurate
BASIS OF Rx	→ ×	→ ✓

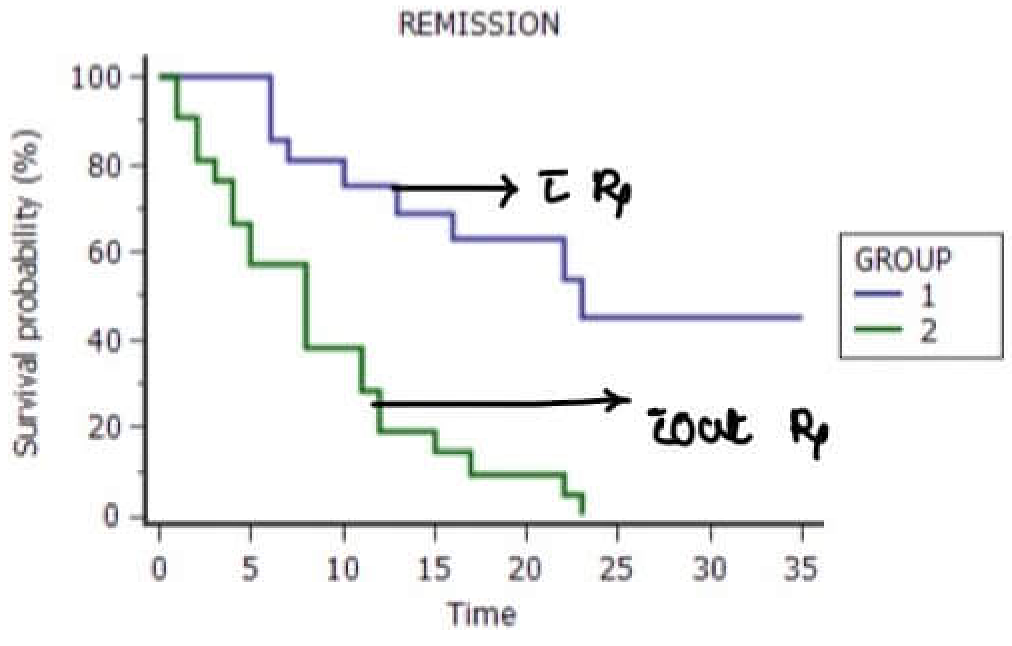
WHY TO DO SCREENING



SURVIVAL ANALYSIS



KAPLAN MEIYER ANALYSIS



→ COLONIC CANCER has highest 5 year survival post screening.

NHP EXAMPLES

	SCREENING	DIAGNOSIS
TB	→ cough > 2 wks	→ Sputum smear Ex. – AFB – ZN-STAIN
MALARIA	→ Fever	→ PBS for MP – JSB Stain
LEPROSY	→ hypoanesthesia	→ Clinical Examinat^{n}
HIV	→ ERS [ELISA RAPID SIMPLE]	→ Western Blot Assay
BREAST CA	→ mammography [Best]; not useful in <35yr Thermography USG BSE [least useful] [recommended in young] Palpat^{n} by Physician MRI [ideal in younger females]	→ FNAC Biopsy
CERVICAL CA	→ Visual Inspect^{n} c̄ 5% Acetic Acid [VIA] > PAP Smear	→ colposcopic punch Biopsy
PROSTATE CA	→ Prostatic Specific Antigen + DRE > PSA DRE	→ Biopsy
LUNG CA	→ Chest X Ray	→ Biopsy, CT Scan
ORAL CA	→ Bi Manual Oral P	→ Biopsy
DIABETES	→ RBS	→ FBS > 126 mg/dl OGTT > 200 mg/dl Hb A1C > 6.5%

TYPES OF SCREENING

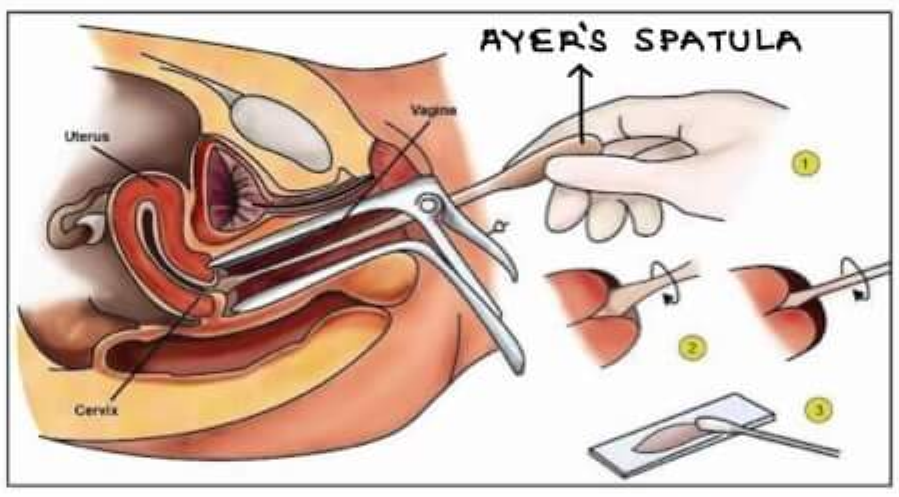
MASS SCREENING → applied on large populat^{n}; Eg : CXR in elderly

HIGH RISK / SELECTIVE S. → applied on high risk group; Eg : Commercial sex workers

MULTIPHASIC SCREENING → ≥ 2 tests to large no. of people, Eg. Annual health check ups

MULTI PURPOSE SCREENING → >1 test applied for >1 disease, Eg. HIV, HBV, HCV in preg. ♀

OPPURTUNISIC SCREENING → Screening of RHD in School children



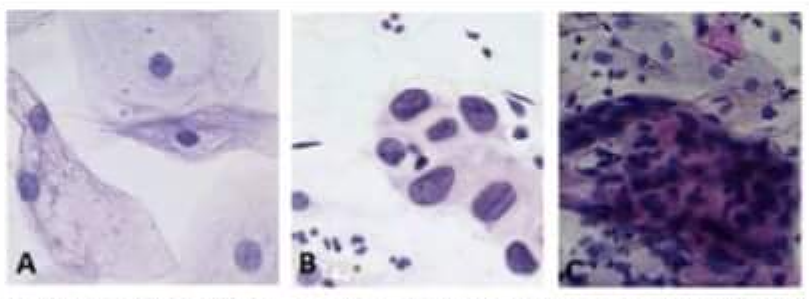
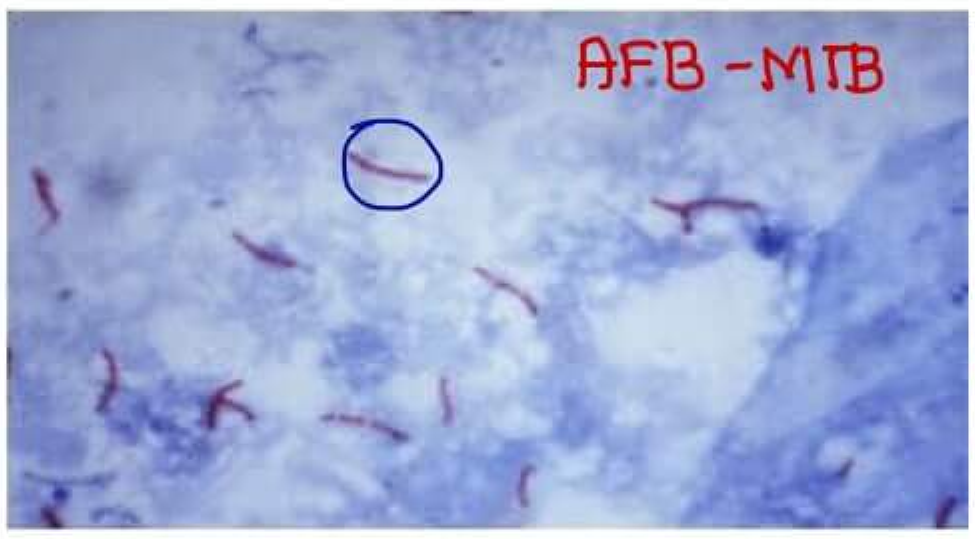
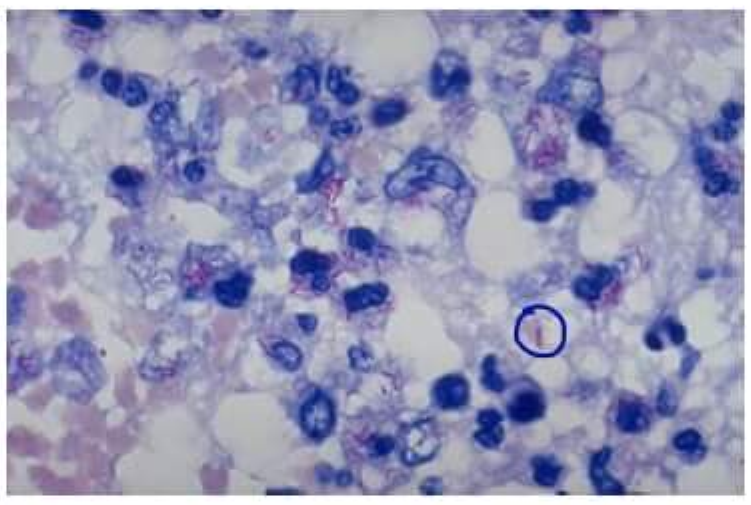


Figure 1: (a) Normal Pap smear image (b) Image of Pap smear with malignant cells (c) overlapped cell clusters and artifacts



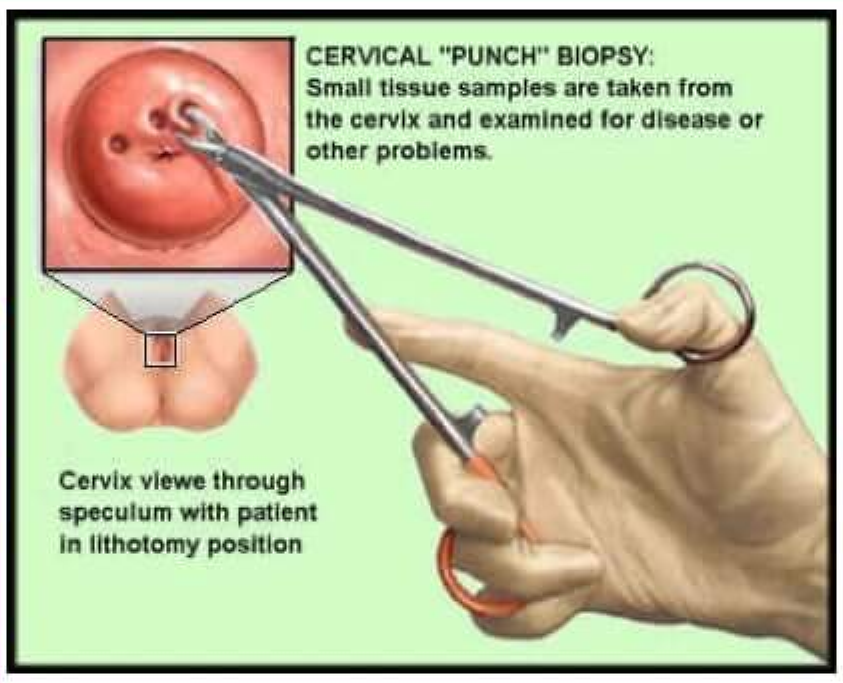


→ Single

→ Rod shaped

→ © beaded appearance

PROPERTIES OF SCREENING TEST

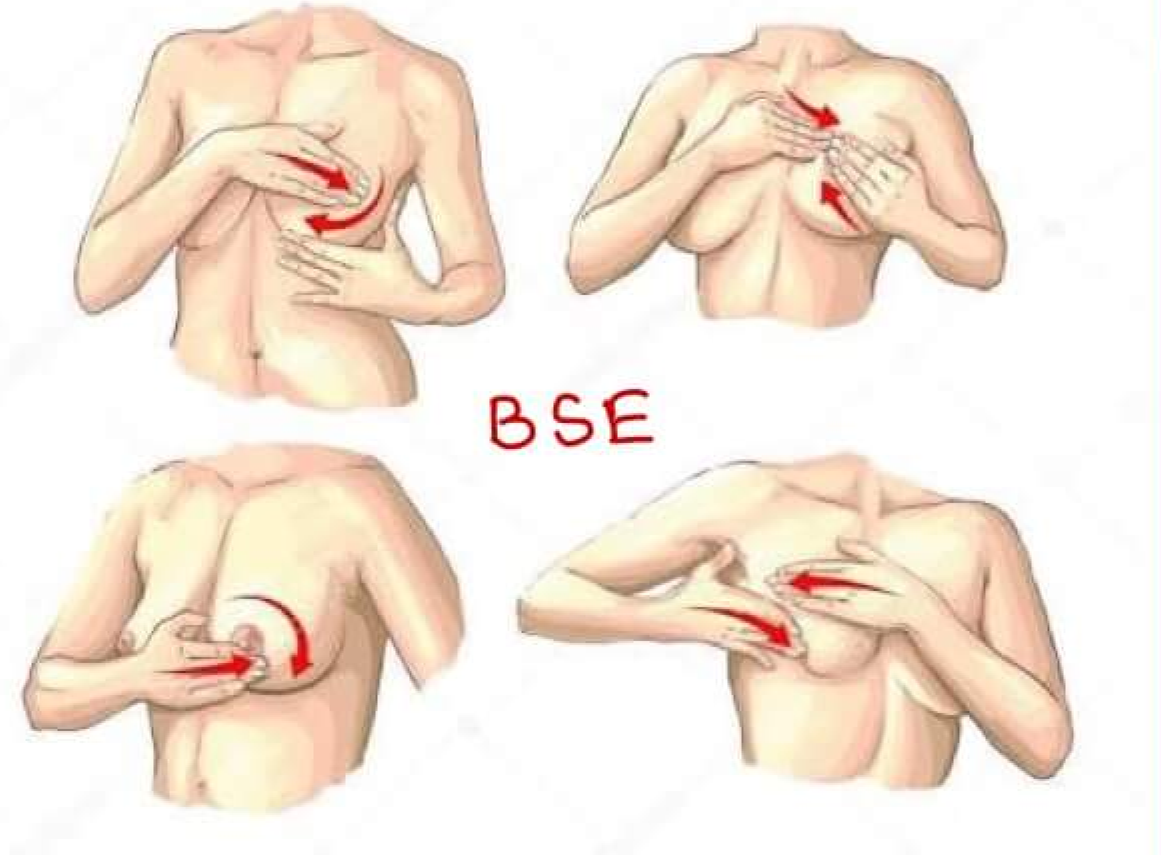

CERVICAL "PUNCH" BIOPSY:
Small tissue samples are taken from the cervix and examined for disease or other problems.
Cervix viewe through speculum with patient in lithotomy position

HIV DISEASE

ELISA Screening Test Results

	⊕	⊖
⊕	ⓐ T P	ⓑ F P
⊖	ⓒ F N	ⓓ T N

SENSITIVITY → $\frac{a}{a+c} \times 100$ $\frac{TP}{TP+FN} \times 100$



SPECIFICITY → $\frac{d}{b+d} \times 100$ $\frac{TN}{TN+FP} \times 100$

PPV [Positive Predictive value] → $\frac{a}{a+b} \times 100$ $\frac{TP}{TP+FP} \times 100$

Bi Manual oral palpatⁿ for oral cancer

NPV [Negative Predictive value] → $\frac{d}{c+d} \times 100$ $\frac{TN}{TN+FN} \times 100$

→ out of those diseased, few report positive on ST → $\frac{a}{a+c} \times 100$ → Sensitivity

→ out of those positive on ST, few actually diseased → $\frac{a}{a+b} \times 100$ → PPV

→ Those diseased as well as positive also → True Positive

PREVALENCE → $\frac{\text{Total no. of cases}}{\text{Total populat}^{n}} \times 100 \rightarrow \frac{a+c}{a+b+c+d} \times 100$

ACCURACY → $\frac{a+d}{a+b+c+d} \times 100$

ⓠ Sensitivity → $\frac{80}{100} \times 100 = 80\%$

Specificity → $\frac{60}{100} \times 100 = 60\%$

PPV → $\frac{80}{120} \times 100 = 66.6\%$

NPV → $\frac{60}{80} \times 100 = 75\%$

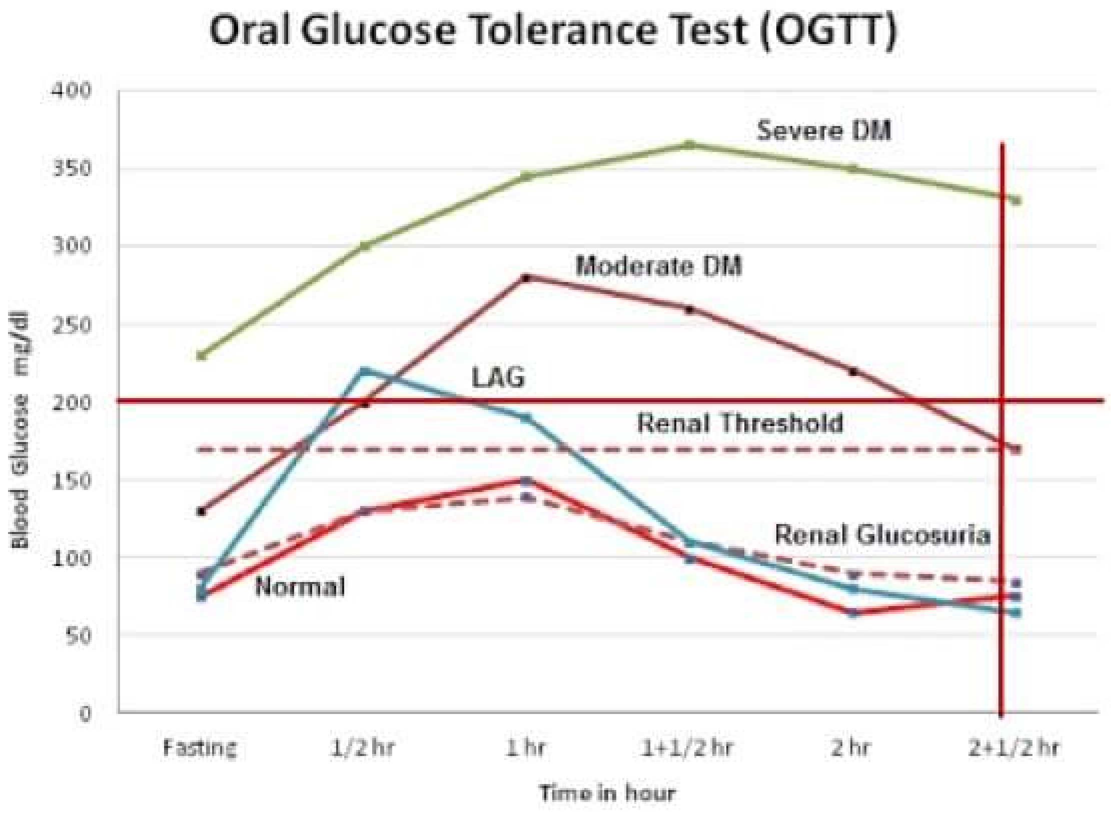
HIV

ELISA

	⊕	⊖
⊕	80	40
⊖	20	60

Ⓠ Sensitivity ∝ TP
∝ 1/FN
1 − FN

Specificity ∝ TN
∝ 1/FP
∝ 1−FP



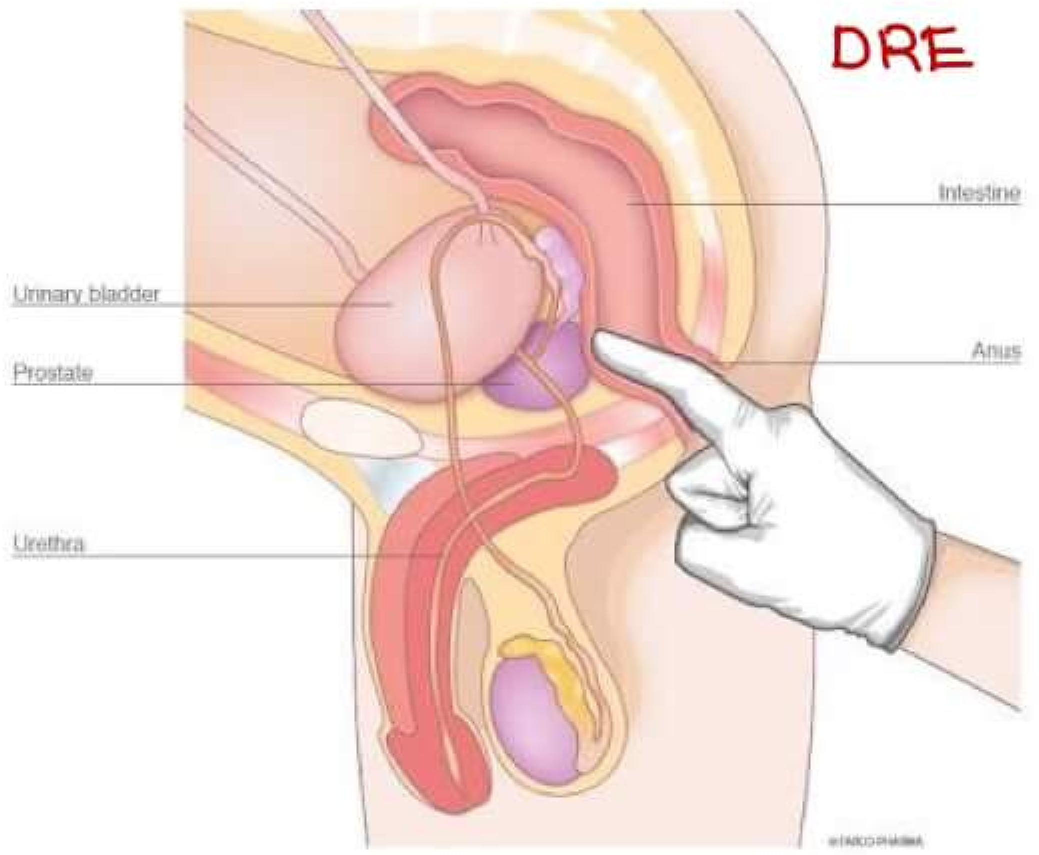
Ⓠ Sensitivity − 90% , Specificity − 90% , Prevalence − 10% ; PPV = ?

BAYE'S THEOREM

$$PPV \rightarrow \frac{\text{sensitivity} \times \text{Prevalence}}{[\text{Sens} \times \text{Prev}] + [(1-\text{Spe})(1-\text{Prev})]} \times 100$$

→ PPV → $\frac{90 \times 100}{(90 \times 100) + (10 \times 90)} \times 100$ → 50%

Use 100 instead of 1


DRE

→ STEP 1

		DISEASE	
		⊕	⊖
Screening Test Results	⊕	a	b
	⊖	c	d

STEP 2 → Total populatⁿ = 1000 [hypothetical]

STEP 3 → Prevelance → 10% → total cases = 1000 × 10% = 100

STEP 4 → Total cases − 100 ; No disease − 1000 − 100 = 900

STEP 5 → Sensitivity − 90% ; a = 90 & c = 10 } Reverse calculatⁿ

STEP 6 → Specificity − 90% of b+d = d = 810 , b = 90 }

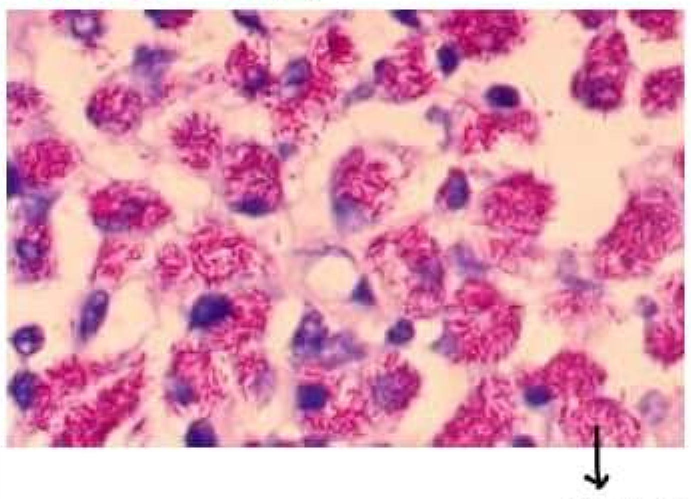
STEP 7 → $\frac{90}{90+90} \times 100 = 50\%$

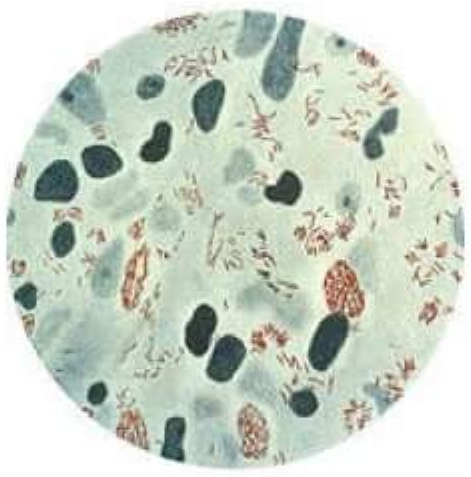
→ PPV depends on Sensitivity , Specificity , Prevelance

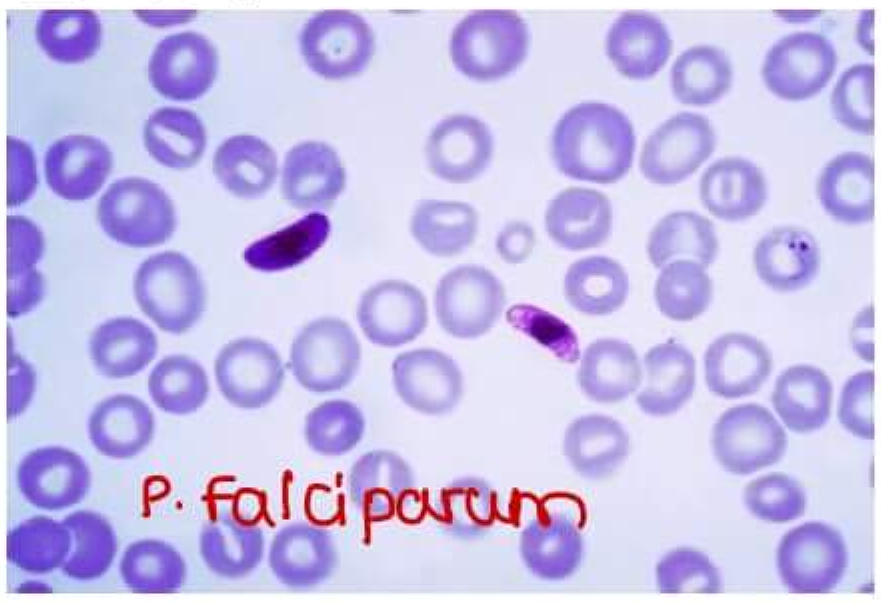
→ Pretest Probability of Disease ≅ Prevelence

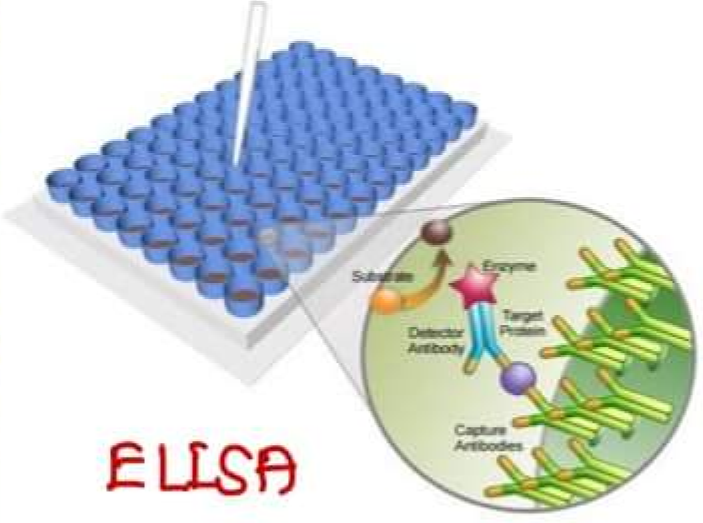
Post test probability ≅ PPV

AFB-ML


↓
GLOBI


; Non beading


P. falciparum


ELISA

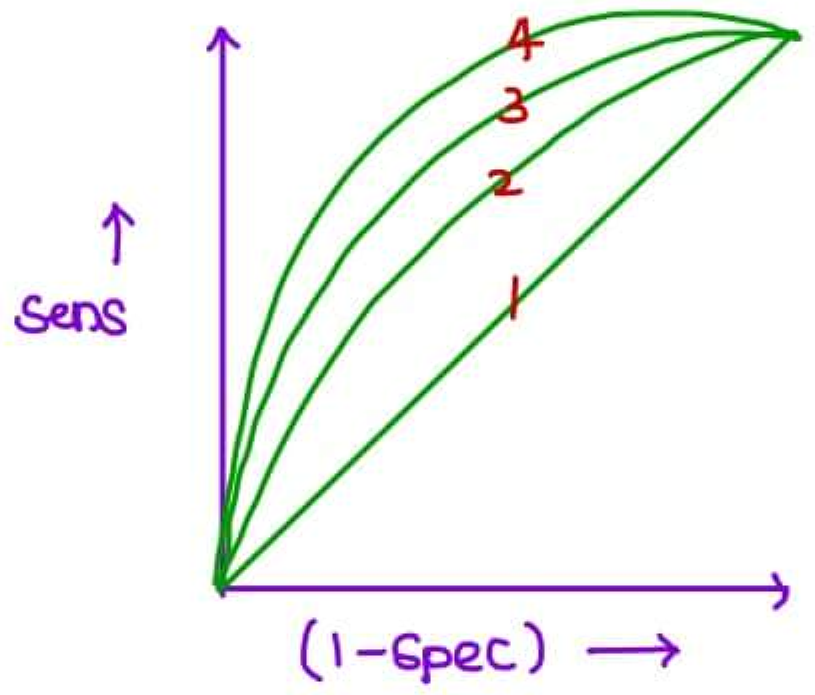
SCREENING TESTS IN COMBINED	One test [after +ve result] after other SERIES	BOTH tests together PARALLEL
SENSITIVITY	Decreases	INcreases
SPECIFICITY	Increases	Decreases
PPV	Increases	Decreases
NPV	Decreases	Increases

ROC CURVE [RECIEVER OPERATOR CHARACTERISTIC CURVE]

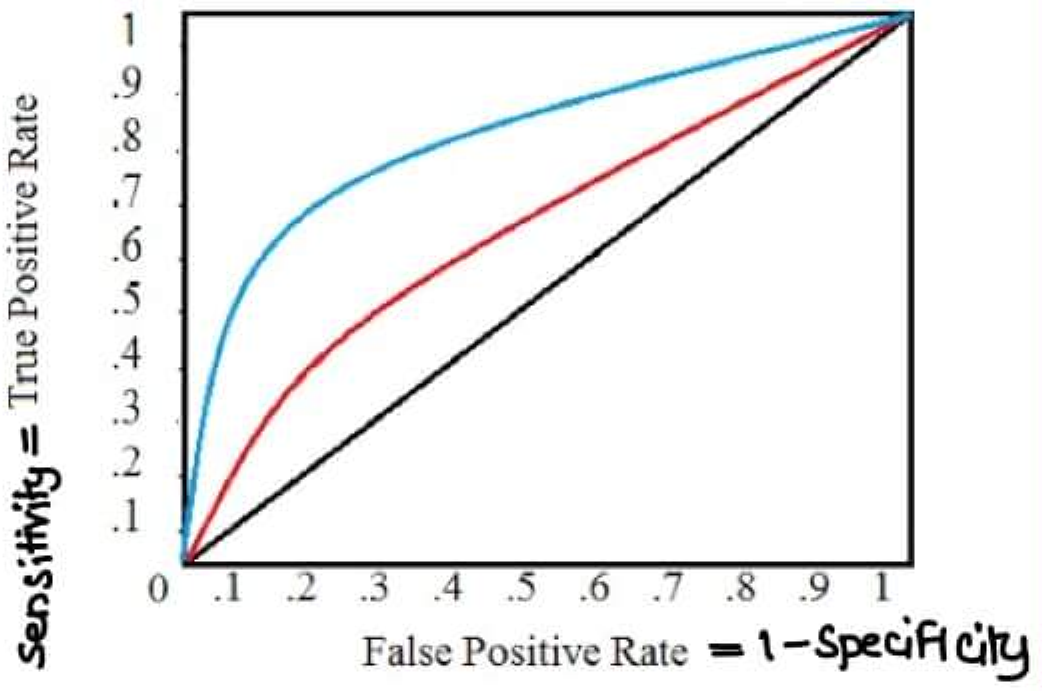
→ Sensitivity ∝ $\frac{1}{\text{Specificity}}$

→ TRADING OFF b/w Sensitivity & specificity

→

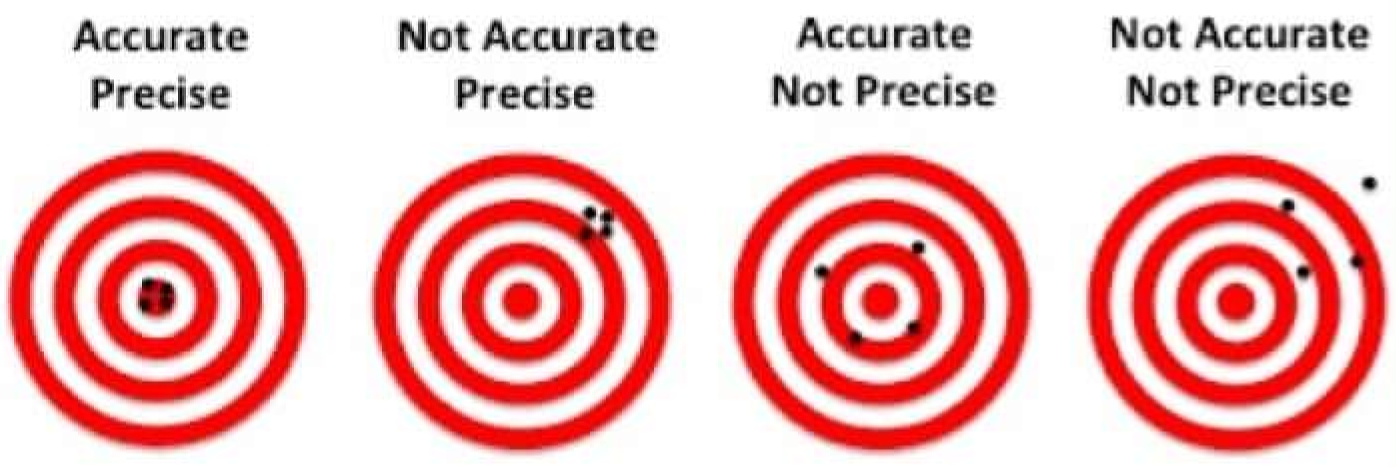


4. Best
3. Good
2. fair
1. No use



PRECISION VS ACCURACY

PRECISION	ACCURACY
Repeatability	close to true/ actual value
consistency	
Reproducibility	
RELIABILITY [now]	VALIDITY [now]



↓
BEST

→ Student BP → 120/80

BP Apparatus 1 → 140/96, ", " } Precise, Inaccurate >>

BP Apparatus 2 → 140/96, 90/20, 30/20 } Imprecise, Inaccurate

BP Apparatus 3 → 120/80, ", " } Precise, Accurate >>>>

BP Apparatus 4 → 122/82, 120/80, 118/78 } Imprecise, Accurate >>>

TESTS

PRECISION / RELIABILITY	ACCURACY / VALIDITY
→ R-chart	→ 01. LEVY JENNINGS CHART [LJC]
→ Range chart	02. MEAN CHART
	03. SHEWART CONTROL CHART

DEMOGRAPHY

Demography → Scientific study of human population
1. Size
2. Composit^{n}
3. Distribut^{n}

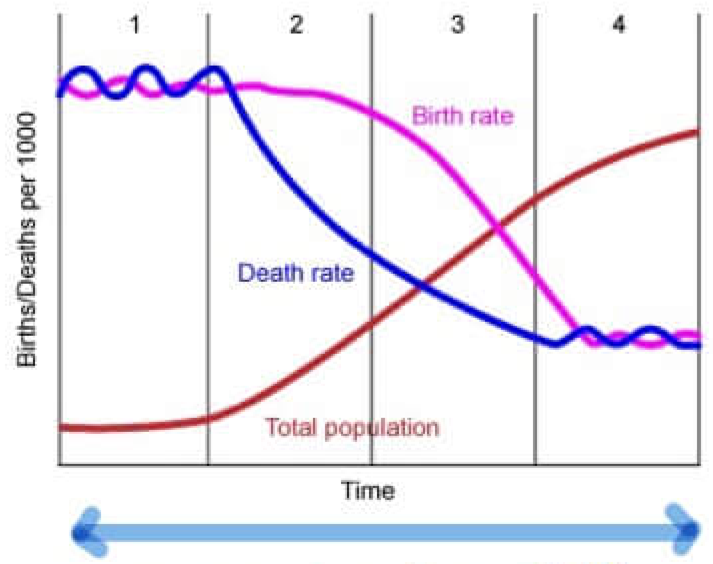
CRUDE BIRTH RATE [CBR] → $\frac{\text{Total no. of Births}}{\text{Total Mid yr populat}^{n}} \times 1000$ → India – 20.2

CRUDE DEATH RATE [CDR] → $\frac{\text{Total no. of Deaths}}{\text{Total mid yr. populat}^{n}} \times 1000$ → India – 6.3

Growth Rate [GR] / DEMOGRAPHIC GAP → CBR – CDR

DEMOGRAPHIC CYCLE

	CBR	CDR
I High Stationary stage	High	High
II Early Expanding Stage	High	Starts ↓
III Late Expanding Stage	Starts ↓	Already ↓
IV Low stationary stage	Low	Low
V Decling Stage	CDR > CBR	

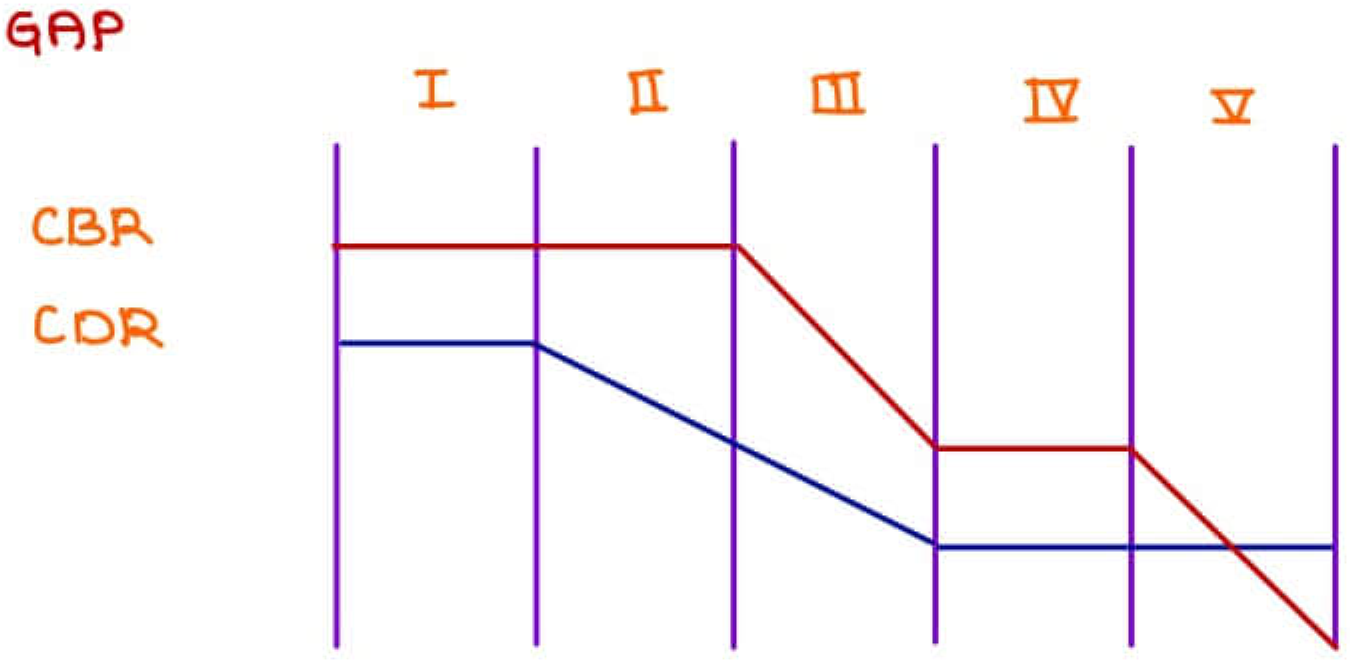


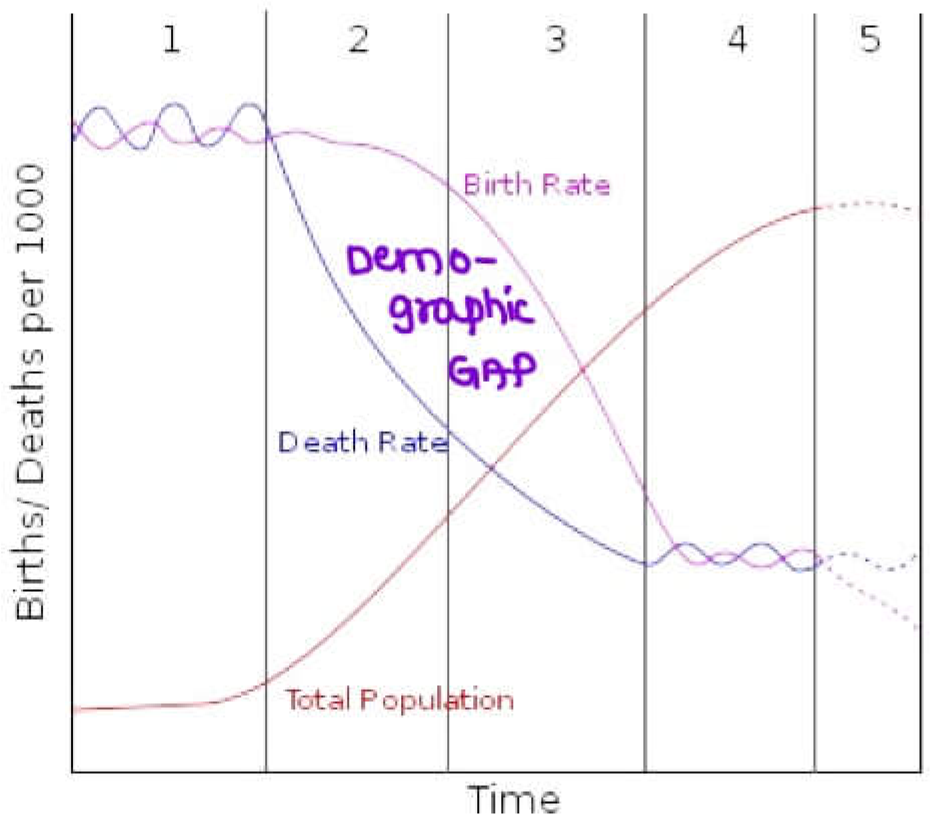
Demographic Transit^{n}

→ India currently in Stage III → CBR 30 ↓ 20   CDR 30 ↓ 06

→ Stage V Countries
  – Russia, Singapore etc

DEMOGRAPHIC GAP





→ Maximum → Late Stage II
Starts contraction → Early Stage III
Minimum → Stage I & IV
Negative → Stage V

→ **Demographic Trasit^{n}** → In Economic development, ↳ High CBR/CDR → Low CBR/CDR

DEMOGRAPHIC FERTILITY INDICATORS

TFR [Total fertility Rate] → Total no. of children born to a ♀ → completed family size

GRR [Gross Reproductⁿ Rate] → Total no. of Girl children born to a ♀

NRR [Net Reproductⁿ Rate] → Total no. of Girl children born to a ♀, taking into account their mortality

Ⓠ If TFR ~ 4, GRR ~ ? → 2

→ $\boxed{\text{GRR or NRR} \sim \frac{1}{2}\ \text{TFR}}$

Ⓠ If TFR = 2.2, CBR ~ ?

$\boxed{\text{CBR} = [8\,\text{TFR}] + 1}$

= 18.6 per 1000 MYP

→ Goal of TFR 2.1 by 2017 → current TFR → 2.2

Goal of NRR 1 by 2017

→ most imp. demographic fertility indicator → NRR

To achieve NRR 1 → CPR > 60%

To achieve NRR 1, ideal contraceptⁿ → Sterilizatⁿ [vasectomy]

GFR [General fertility Rate] → $\frac{\text{Total Live Births}}{\text{Total women [15-49 yr]}} \times 1000$

CWR [child women Ratio] → $\frac{\text{Total children [0-4 yrs]}}{\text{Total women [15-49 y]}} \times 1000$

DR [Economic Dependency Ratio] → $\frac{< 15\text{ y} + > 65\text{ yrs [Non earning]}}{15\text{–}65\text{ yrs [earning]}}$

Ⓠ 0–15 yrs – 30%

> 65 yrs – 10%

DR ?

→ $\frac{30\% + 10\%}{60\%} = 0.66 = \frac{66}{100}$

→ 66 non earning populatⁿ dependent on 100 earning populatⁿ

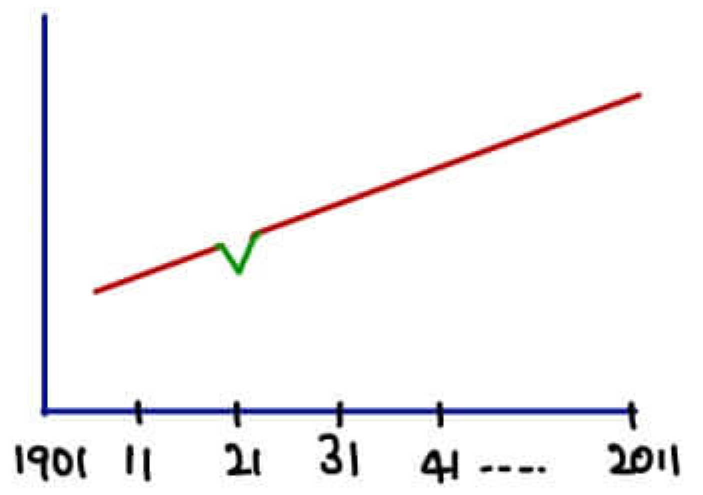
100 Earning populatⁿ is supporting total of (100 + 66) 166 populatⁿ

CENSUS, SRS, NFHS, DLHS, VRS

CENSUS

→ once every → 10 yrs [last @ 2011]
first census → 1871 [15 till now]
first Disability census → 1881
census stop → 01 march 00.00 Hrs
Big / Great Indian devide → Census of 1921

Big / Great Indian devide → only in 1921 census, we observed decline



→ Ministry → Home Affairs
→ New inclusions in census 2011

1. 10 finger prints
2. Iris scan
3. Photograph
4. UID [Aadhar No.]
5. NRC [National Register for citizens]

Sex Ratio

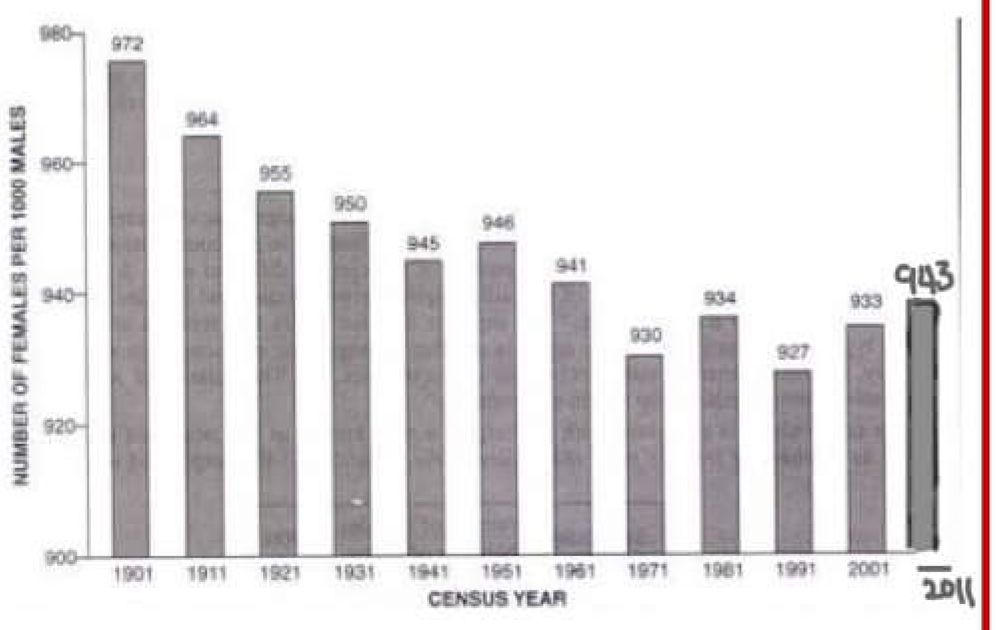
→

$$SR = \frac{\text{No. of females}}{\text{No. of Males}} \times 1000$$

→ SR India → 943 F / 1000 M [due to female infanticides]
Highest → Kerala → 1084
lowest → Daman & Diu → 680 [union Territory]
Haryana [state]

ⓠ Total populatⁿ 10,000
M : F → 3:2, SR → ?

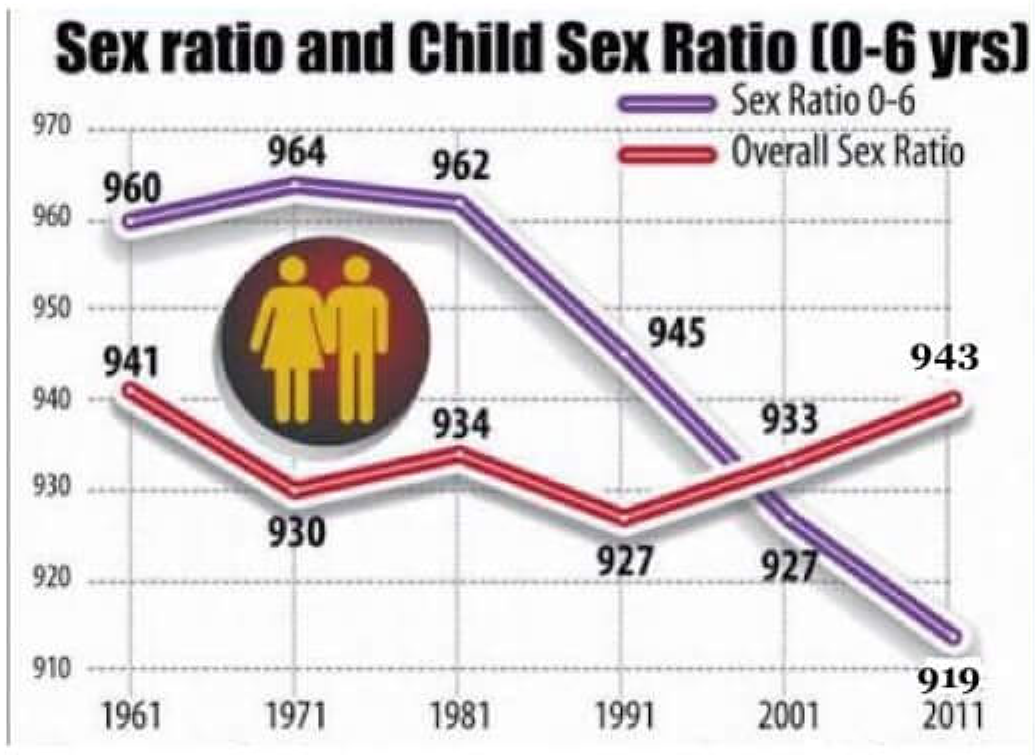
→ $SR = \frac{3x}{2x} \times 1000$ → 666.6 F / 1000 M



Child Sex Ratio

→

$$CSR = \frac{\text{Females (0-6y)}}{\text{Males [0-6y]}} \times 1000$$



→ CSR India → 919

→ Highest → Mizoram

Lowest → Haryana

Literacy Rate

→

$$LR = \frac{\text{Total no. of literates}}{\text{Total pop.} \geq 7\text{yrs}} \times 100 \rightarrow \text{Proportion}$$

→ LR India → 74% [3/4th] → M – 82% [4/5th]; F – 65% [2/3rd]

→ Highest → Kerala

Lowest → Bihar

→ Literate → Read, write & understand any 1 language [≥ 7yr age]

→ LR used in → PQLI, HDI, HPI-1

GROWTH Rate

→ Decadal GR → 17.64%

→ Annual GR → 1.64%

→ India in → Very rapid growth Phase

→ Populatn doubles in 35-47 yrs

→ % Geriatric → 8%

→ % 0-5yrs old → 10%

→ % urban → 31.3%

☐ SAMPLE REGISTRATION SYSTEM [SRS]

→ Once every → 6 months

→ most accurate Data collecting system b/c only dual record data in India

→ IMR, MMR, U5MR, NNMR, CBR, CDR, GR collected

→ ministry → Home affairs

SRS 2019 LATEST DATA

CBR	20.2 per 1000 mid-year population
CDR	6.3 per 1000 mid-year population
Decadal Growth Rate	13.9%
IMR	33 per 1000 live births
MMR	122 per 100000 live births

III National family Health survey [NFHS]

→ Once every → 5-6 yrs by International Institute of Populatⁿ sciences, Mumbai

Rounds completed → 4

NHFS 1 → 1992 – 93
2 → 1998 – 99
3 → 2005 – 06
4 → 2015 – 16

NFHS – 4 Data [2015-16]

→ TFR → 2.2
→ ≥ 4 Anti natal visits → 51%
→ Institutional Deliveries → 79%
→ EBF [Excl. Breast feeding] → 55%
→ Underweight → 36%
→ Wasted → 21%
→ Stunted → 38%

IV District Level House hold Survey [DLHS]

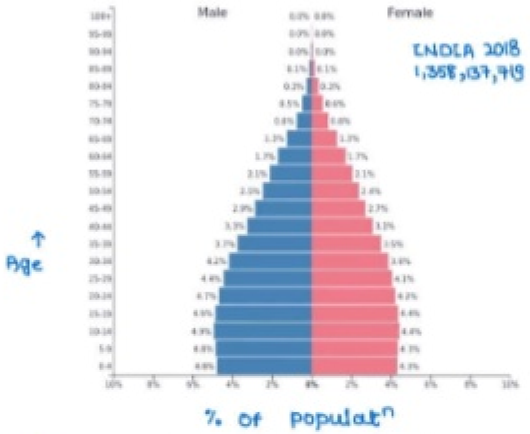
→ Once every → 5yr
→ Rounds completed → 4

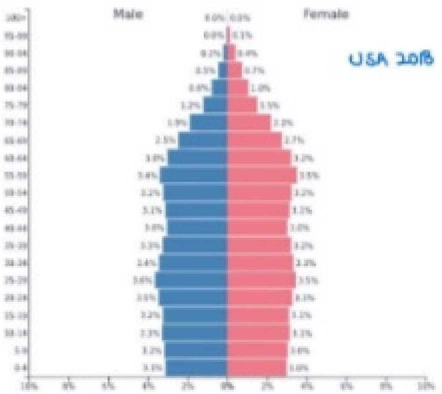
DLHS 1 – 1998 – 99
2 – 2002 – 04
3 – 2007 – 08
4 – 2012 – 13

V VITAL REGISTRATION SYSTEM [VRS]

→ Births → <21 Days
→ Deaths → <21 Days
→ Marriages → 30 Days / 60 Days / 90 Days
→ Child Borne to NRI couple abroad, birth registratⁿ done ₹in 60 Days of arrival
→ Birth Registratⁿ is responsibility of Hospital

Populatⁿ Pyramid / Age – sex Pyramid → Type of double Histogram





1. Shape → indicative of fertility

Upright △le, ₹ Broad Base & Narrow Top
Developing countries

Spindle shaped pyramid ₹ bulge in middle
Developed countries

	Developing country	Developed country
2 SPAN → indicates life expectancy	shorter	Taller
3 Symmetry → indicates Sex Ratio	Asymmetrical	Symmetrical

→ 3's of a populatn pyramid helps in understanding the demographies of a country

PREVENTIVE OBSTETRICS, PEDIATRICS & GERIATRICS

OBSTETRIC CARE IN RCH

→

$$\begin{tikzcd} \text{NFPP 1952} \arrow[r, "\text{MCH}"] & \text{CSSM 1992} \arrow[r, "\text{RTI/STI}"] & \text{RCH 1997} \end{tikzcd}$$

[NHM - 2013]

NFPP → National Family Planning Programme
MCH → Maternal & child health
CSSM → Child survival safe Motherhood
RTI → Reproductive Tract Infections
STI → Sexually Transmitted Infections
NHM → National Health Mission
RCH → Reproductive & child health programme [part of NHM - 2013]

→ OBSTETRIC CARE [EARLIER]

↓

OBSTETRIC & NewBorn Care

Essential ONC | Emergency ONC

Emergency ONC → BEMONC [Basic] | CEMONC [Comprehensive]

Essential ONC	BEMONC [Basic]	CEMONC [Comprehensive]
Level I	Level II	Level III
PHCs	24x7 PHCs, CHCs	DH, FRU's
1. Registratn	1. Manual Removal of Placenta	BEMONC
2. AN care	2. Oxytocics	&
3. Safe Delivery	3. Antibiotics	8. Blood transfusn
4. PN care	4. Anticonvulsants	9. Surgery
5. New Born care	5. Assisted Delivery	
	6. Vaccum Aspiratn	
	7. NB Resuscitatn	

AN VISITS

→ Recommended AN Visits → 13 – 14

0 – 7 months → once a month → 7
8th month → Twice a month → 2
9th m. onwards → once/ week → 4-5
13-14

→ Minimum AN Visits → ≥ 4

1 → Registrat^n
2 → 14 – 26 WKS POG
3 → 28 – 34 WKS POG
4 → 36 W – Delivery

→ minimum PN visits → 3 - 4

↳ 3 in institutional delivery [Day 3, 7, 42]
↳ 4 in home delivery [Day 1, 3, 7, 42]

MPW [F] / ANM takes the responsibility of PN visits
ASHA worker Post natal visits seperately → 6 - 7

– 6 in Institutional delivery → Day 3 7 14 21 28 42
– 7 in home delivery → Day 1 3 7 14 21 28 42

MCH INDICATORS

IMR [Infant mortality Rate] → Infant < 1 yr

MMR [Maternal Mortality Rate] → Maternal Death
Any time in Pregnancy, labour/delivery or
< in 42 days of delivery

U5MR [Under 5 mortality Rate → U5 Death → 0-5 yrs
NNMR [Neonatal mortality Rate] → NN Death → 0 -28 Days
PNMR [Perinatal mortality Rate] → PN Period → 28 WKS POG ↔ 7 D Post delivery
SBR [Still Birth rate → Still Birth → POG > 28 WKS
BW > 1000 gms
BL > 35 cm

MCC India

IMR → $\frac{\text{Infant Death}}{\text{Live Birth}} \times 1000$ [33] LBW & Prematurity

DC → PPH

MMR → $\frac{\text{Maternal Death}}{\text{Live Birth}} \times 100\,000$ [122] PPH

IDC → Anemia

U5MR — $\frac{\text{Under 5 Death}}{\text{Live Birth}} \times 1000$ [39] LBW & Prematurity

NNMR → $\frac{\text{Neonatal Death}}{\text{Live Birth}} \times 1000$ [24] LBW & Prematurity

PNMR → $\frac{\text{Peri Natal Death}}{\text{Live Birth}} \times 1000$ [23] LBW & Prematurity

SBR → $\frac{\text{Still Birth}}{\text{Live Birth}} \times 1000$ [22] Maternal Infections
Abruptio placenta

IFA TABLETS

	Adult Tablet	Kids syrup
→ Iron	60 mg	20 mg
Folic Acid	500 μg	100 μg
	1 tab/D x 180 Days [4-5-6 m POG] & [Lactation/3m]	1 Biweekly [6-59 months of age]

TT in Pregnancy

Primi → 2 doses [1 month apart] → ASAP in Pregnancy [No CI in 1st Trim.]
2 doses → Total durat^n^ of protect^n^ ~ 5 yrs
Next pregnancy occur ē in 3 yrs → only 1 Booster Dose [ASAP]

→ 1 Dose in current pregnancy & Next pregnancy with in 3 yrs
→ 2 Doses of TT ASAP [1 month apart]

PEDIATRIC CARE IN RCH

BIRTH WEIGHT

- → Average Birth weight → 2.8 Kg
- → LBW in India → < 2.5 Kg
- → If pre term Delivery, LBW → < 2.5 Kg
  [LBW doesn't depend of Gestat^n^ Age]
- → minimum sample size required to estimate prevalence of LBW → 500

WHO classificat^n^ of LBW

LBW	< 2.5 Kg
VLBW	< 1.5 Kg
ELBW	< 1 Kg

PRE TERM
<37wks

TERM
37-42 wks

POST TERM
> 42 WKS

} LBW ⟶ SFD [Small for Date] → < 10th percentile wt for gest. age
SGA [Small for Gest. Age]
• mcc → IUGR

SALTER'S SCALE

- → BW measured by → SALTER'S SCALE [Spring Balance]
- → BW Doubles by → 5m
  - Triples by → 12m
  - Quadraples by → 2 yrs

BIRTH LENGTH

- → Average BL India → 50 cms
- → Ht at the end of Infancy → 75 cms
- → Ht doubles by → 4 yrs
- → Field instrument → Infantometer

Infantometer

BREAST FEEDING

- → Exclusive Breast feeding till → 0-6 months
  - Breast feeding till → 0-2 yrs

- → vaccines [OPV, Rotaviral vaccine]
  - Medications [ORS also]
  - Vit B Supplementation

  } permitted in Exclusive breast feeding

- → Energy content → 65 Kcal / 100ml
  - Protein content → 0.9 to 1.1 gm / 100ml

- → most abundant type of Ig → Ig A > Ig D, Ig G, Ig M, Ig E
- → most abundant Ig in colostrum / beestings → Ig A Ig D, G, M, E

- → EFA exclusive to Breast milk → DHA
  - helps in Brain development [myelinatn]
- → AA in Breast milk → Taurine [useful in Brain development]

- → vitamin most deficient in Milk → Vitamin C
  - most def. in Breast milk → Vitamin D

Breast feeding Initiatn Guidlines

→ After a normal vaginal Delivery → ASAP / < 1hr

After a C section → ASAP / < 4hrs

After a NVD → At the delivery table itself
[Early release of Oxytocin → ↓PPH

Higher Quantities of HUMAN MILK	COWS MILK
Lactose	Energy [67]
Iron	Proteins
Water	Fats
Ca^{2+} : P Ratio	Calcium, Phosphorous
Vit A, C	Vit B, D
Cu, Co, Se	Na^+, K^+
Cysteine, Taurine	Methionine
Linoleic Acid	
Linolenic Acid	
PUFA	
Casein : Whey [40 : 60]	Casein : Whey [80:20]

GROWTH & DEVELOPMENT & NUTRITIONAL STATUS

BEST Indicators in children

1. Growth → Weight [Weight for Age]
   Development → Weight [Weight For Age]
   Nutritional status → Weight [Weight For Age] > MAC [mid Arm Circumference]

MID ARM CIRCUMFERENCE

→ Field instrument → SHAKIR'S TAPE

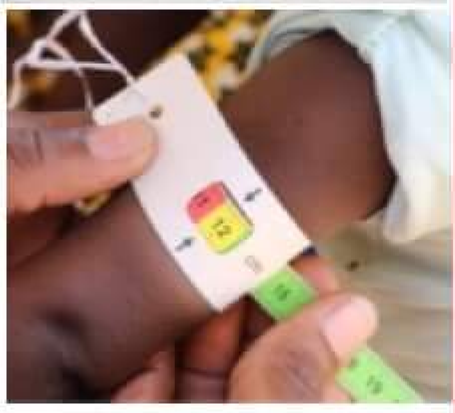
→ Normal → > 13.5 cm [Green] → Home Mx

mild - mod PEM → 12.5 – 13.5 cm [yellow] → PHC Mx

Severe PEM → < 12.5cm [Red] → Referral

→ Age group → 6 m – 5yr

SHAKIR'S TAPE



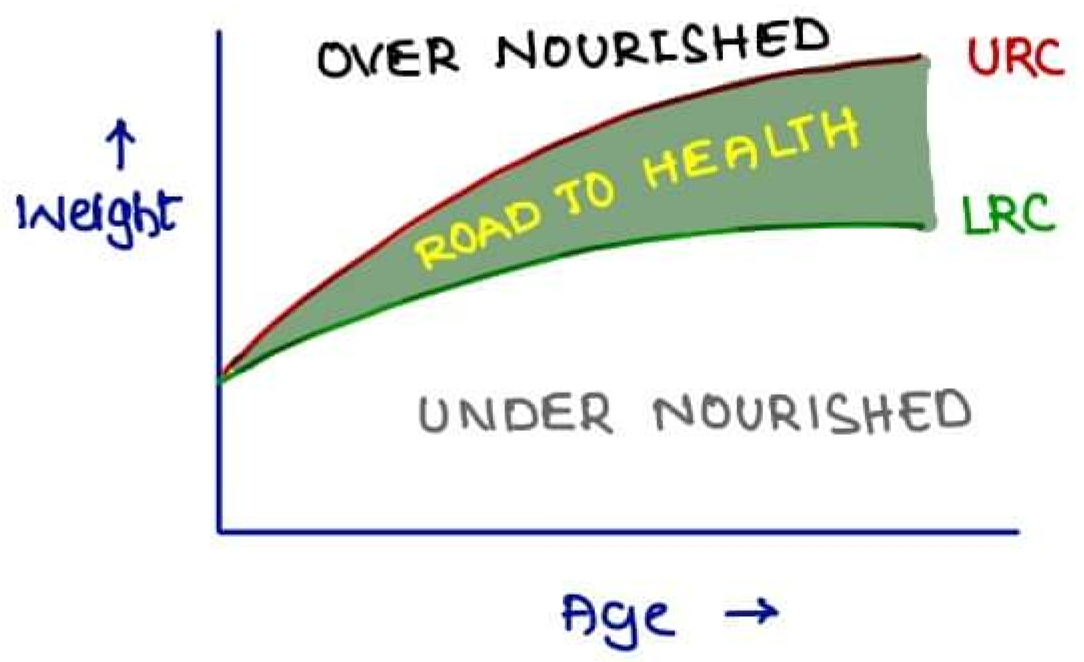
PEM STATUS INDICATORS

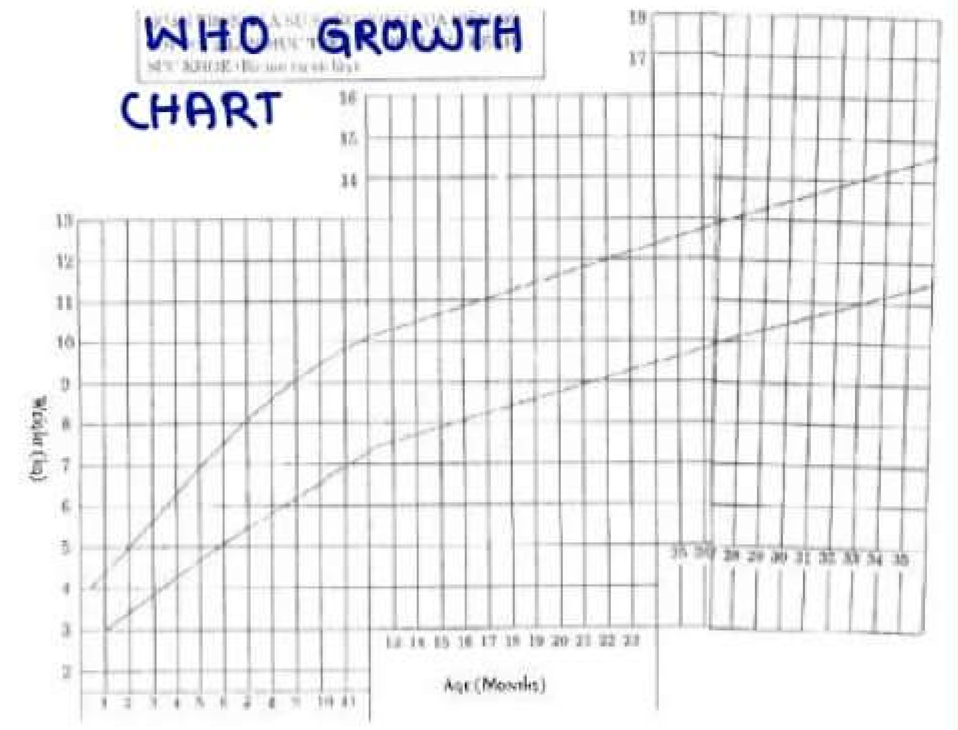
1. Low wt for Age → UNDER WEIGHT → Acute on chronic PEM
2. Low Wt for Height → WASTING → Acute PEM
3. Low Ht for Age → STUNTING → Chronic PEM

GROWTH CHART

- → Passport to child growth
- → Given by DAVID MORLEY
- → > 55 types + nt.

WHO Growth chart





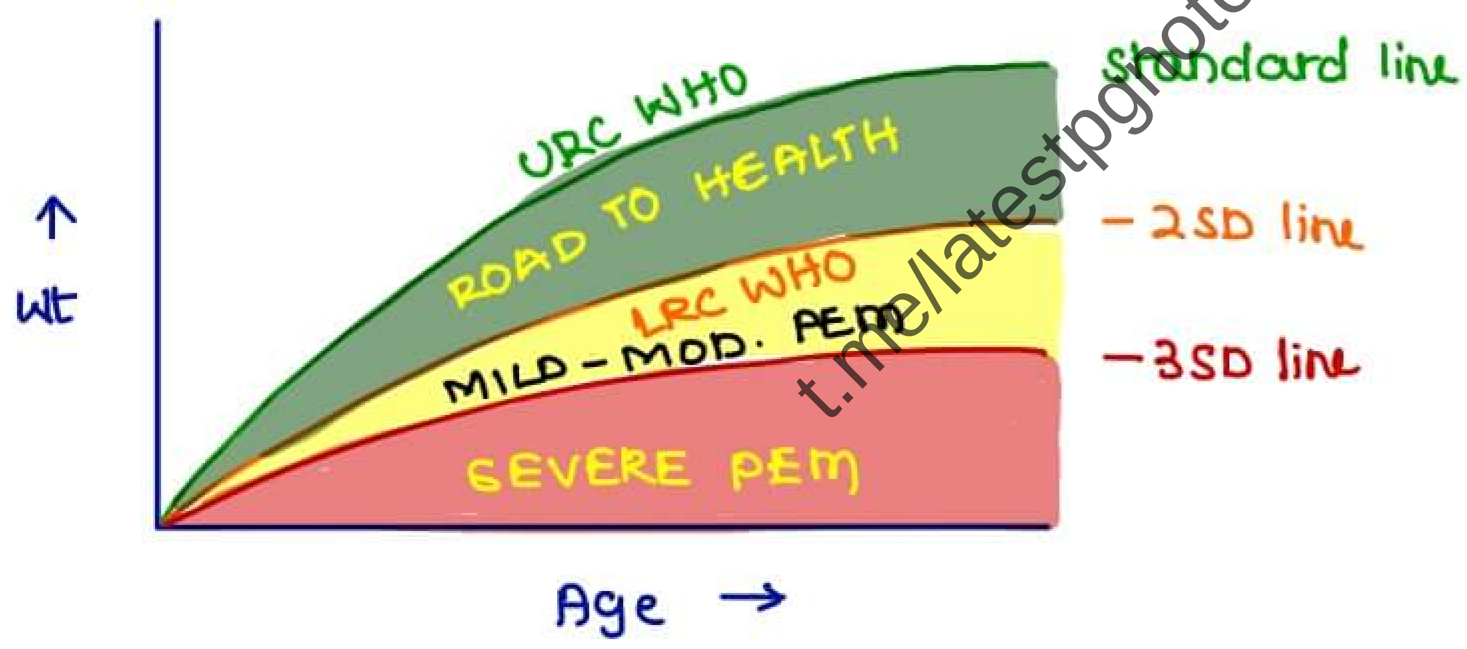
URC - Upper reference curve → 50th percentile for Boys

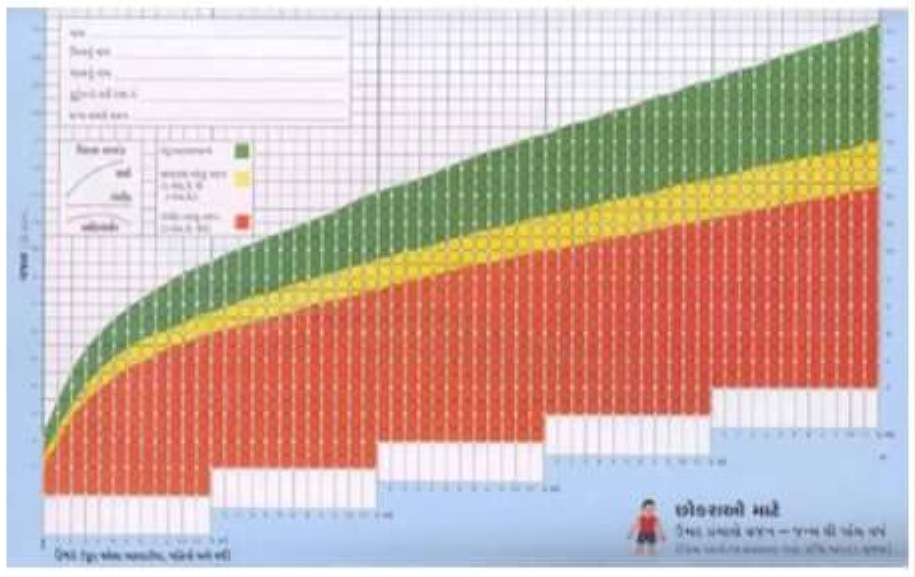
LRC - Lower reference curve → 3rd percentile for Girls = 80% OF URC

lies - 2SD below URC

Based on NCHS [National centre for Health Satistics]

ICDS Growth chart [Integrated child Development services]





Used @ ANGANWADI

Standard line → 50th percentile for Boys

- 2SD line → 3rd percentile for Girls

Based on MGRS [Multicentric Growth Reference Study] Standards

- WHO Child Growth Standards 2006.

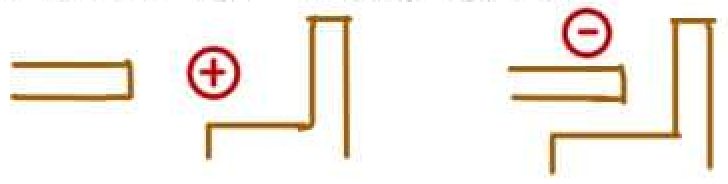
SCHOOL HEALTH

→ First recommended by BHORE Committe [1943]

Comprehensive School Health Programme by RENUKA ROY Committe [1960]

HEALTHFUL SCHOOL ENVIRONMENT

1. 1 class room < 40 students
2. Per capita space > 10 sq. Feet
3. Door & Windows area > 25% of Floor area
4. Desk - minus type



5 Natural light from lt side

6 1 urinal / 60

1 Sanitary Latrine / 100

7 Recommended frequency of school Health Examinatⁿ ONCE / 6 months

SCHOOL VISION SCREENING PROGRAMME

→ screening done by class teacher

→ 1 Teacher / 150 Students

→ Visual Acuity cut off for Referral → <6/9

PREVENTIVE GERIATRICS

→ Geriatric Age → > 60 yrs

→ Geriatric populatⁿ → 8%.

→ mc health disorder → cataract

mcc of Death in >70y → Cardio Vascular Diseases

NUTRITION & HEALTH

NUTRITION → Science that studies interactⁿ of nutrients in relatⁿ to the maintainance, growth, repair, health & disease in body

NUTRIENTS

MACRO NUTRIENTS	MICRO NUTRIENTS	TRACE NUTRIENTS
→ grams/day	→ mg/day	→ μcg/day
→ carbohydrates	→ Iron	
fats	Iodine	
Proteins	Zinc	
	calcium	
	vitamin A	

PROXIMATE PRINCIPLES ≅ MACRO NUTRIENTS

- → carbs, fats, proteins
- → Energy → Fats [9 Kcal/gm] > Proteins [4.2 K.cal/gm] > carbs [4.1 K.cal/gm]
- → Importance → Proteins > Fats > carbs
- → Balanced Diet → 10-15% 15-30% 50-70%

PROTEINS, FATS, RICH SOURCES

PROTEINS

QUANTITY

1. Protein Energy Ratio

QUALITY

Best indicator – ↓ing order

1. Digestible Indispensable AA Score [DIAAS]
2. Protein Digestibility corrected AA Score [PDCAAS]
3. Net protein Utilizatⁿ
4. Amino Acid Score
5. Biological value
6. Protein efficiency ratio

NPU [Net Protein Utilizatⁿ]

$$\rightarrow NPU \rightarrow \frac{BV \times DC}{100} = \frac{N_2\ Retained}{N_2\ Intake} \times 100$$

BV - Biological value
DC - Digestibility co-efficient

→ Highest NPU found in Egg → 96
Milk → 81
Meat → 79

→ Highest quality → EGG → REFERENCE PROTEIN
Highest quantity → Soyabean [43.2% proteins]

EGG

→ 6g	Proteins
6g	Fats
1.5mg	Iron [Fe^{2+}]
30mg	calcium
250mg	cholesterol
70K.cal	Energy

→ Highest NPU is d/t it contains all Essential Amino Acids in balanced proportions

SOYABEAN [Among pulses]

→ Highest Proteins [43%]
NPU
FAT
Energy [432 Kcal/100g]
Iron
vit B_1, B_2 ...

SOYABEANS

ESSENTIAL AA [EAA]

→ 10 [8+2]

→ P	Phenyl Alanine
V	VAline
T	Tryptophan
T	Threonine
I	Isoleucine
M	Methionine
H	Histidine
A	Arginine
L	Leucine
L	Lysine

Histidine, Arginine } Semi EAA →
→ Infancy
→ Adolescence
→ pregnancy
→ Lactatⁿ
} In these conditions

LIMITING AMINO ACIDS

→ Deficient in a food item

→ Maize → Tryptophan & Lysine
cereals → Threonine & Lysine
Pulses → Methionine & Cysteine

→ supplementory Actⁿ of proteins
- Two different food items must be eaten together

FATS

ESSENTIAL FATTY ACIDS [EFAs]

- → Linoleic Acid → most essential
  Linolenic Acid
  Arachidonic Acid
  Eichosa Pentanoic Acid
  Docosa Hexanoic Acid [DHA]

RICHEST SOURCES

Order

→ EFA → Safflower oil
Sunflower oil
corn oil
Soyabean oil
⋮
Olive oil
Groundnut oil
⋮
coconut oil

SUN FLOWER

SAFFLOWER

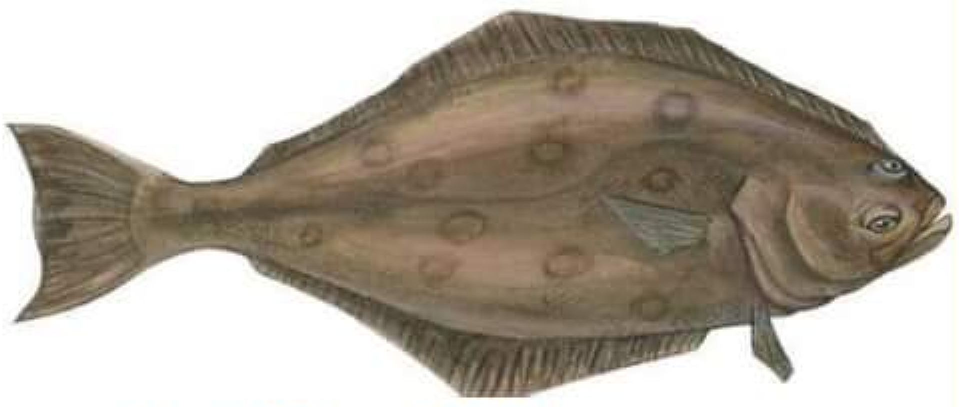
→ Linoleic Acid
Arachidonic Acid
PUFA
} SAFFLOWER OIL

→ MUFA → Olive oil
→ SFA → coconut oil

→ Linolenic Acid → Flaxseed oil
Soyabeen oil

→ EPA → Fish oils

→ Iron → Dried Pumpkin seeds
Pistachio Nuts
cashew nuts


HALIBUT FISH

→ vitamin A
- overall → Halibut fish liver oil, other fish liver oils.
- Fruits → Riped mango
- Vegetables → carrots

→ vit D

- overall → fish liver oil [Halibut]
- fruits → ×
- vegetables → ×

• NO Plant source → vit D, → vit B_{12}

• Strict vegetarians develop deficiency of B_{12}

→ vit C

- 1. Amla [Indian Gooseberry]
  2. Guava [Non citrus]
  3. Cabbage [vegetable]
  4. Other citrus fruits

→ GOLDEN RICE

- Genetically modified crop [GMC]
- rich in Iron & β carotene

polished Rice

Golden Rice

POOR SOURCES

→ EGG → carbohydrate & vit C
Milk → Iron & vit. C
Meat → calcium
fish → carbohydrate & Iodine

RDA , NUTRITIONAL REQUIREMENTS

RDA [Recommended Dietary Allowance]

→ Nutritional requirement for any nutrient that can satisfy the needs of 97.5% populatn.

→ All Nutrients ⟶ Actual Requirement + some extra
Energy → Actual Requirement + No extra

→ REFERENCE INDIAN

	MAN	WOMAN
Age	18-29yr	18-29yr.
Weight	60kg	55 kg
Height	1.73 m	1.61 m
BMI	20.3	21.2
Activity levels	8hrs of sleep 8hrs of moderate work 4-6 hrs of sitting / moving 2hrs of walking / Recreatn	

ENERGY REQUIREMENTS

	MAN	WOMAN	
Sedentary	2300	1900	Kcal/D
Moderate	2700	2200	Kcal/D
Heavy	3500	2900	K.cal/D

PROTEIN REQUIREMENTS

MAN	WOMAN	
0.83	0.83	g/kg/day

ENERGY REQUIREMENTS

INFANTS

	0-6 m	6-12m
K.cal/Kg/D	92	80
K.cal/D	500	670

PROTEIN REQUIREMENTS

INFANTS

	0-6m	6-12m
g/kg/D	1.16	1.69

ADDITIONAL ENERGY REQUIREMENTS [Kcal/D]

Pregnancy	+ 350
Lactat^{n}	
0-6m	+ 600
6-12m	+ 520

	Iron mg/D		Folic Acid McgID	Calcium mg/D	Vit A Mcg/D Retinol	IODINE Mcg/D	FLUORINE mg/Ltr = ppm
	ACTUAL Requirement	Recommended Intake					
Man	0.8	17	200	600	600	150	0.5-0.8
Woman	1.6	21	200	600	600	150	0.5-0.8
Pregnancy	2.8	35	500	1200	800	250	0.5-0.8
Lactat^{n}	1.6	21	300	1200	950	220-290	0.5-0.8 optimum level

→ Fluorine → Double edged sword

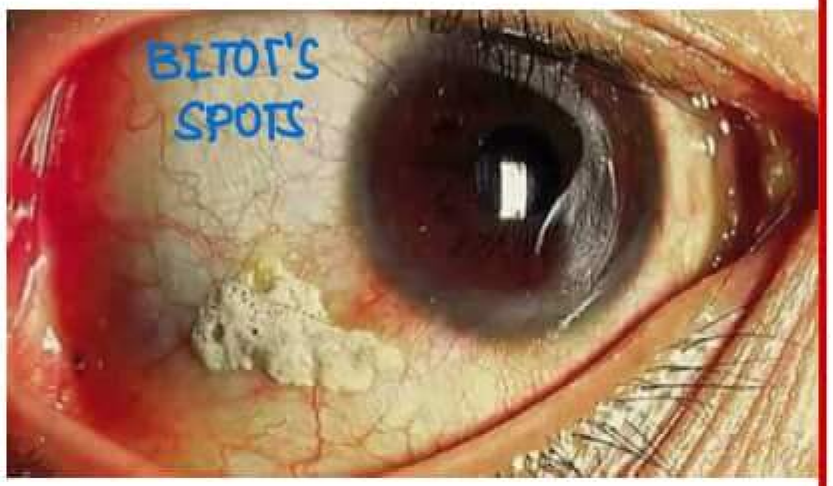
→ FOLIC ACID REQUIREMENTS for Adolescents → 400 Mcg/D

→ Calcium Requirements for Infants → 500 mg/D

→ Vit A Requirement for Infants → 350 Mcg/D

→ Sodium requirement → 2000 mg/D
→ Potassium requirement → 3500 mg/D
→ Zinc requirement → 10-12 mg/D
→ Vit K requirement → 0.03 mg/kg/D

NUTRITIONAL DEFICIENCIES



VITAMINS & DEFICIENCIES

VITAMIN A DEFICIENCY - XEROPHTHALMIA

→ Vit A deficiency leads to XEROPHTHALMIA [WHO]
→

Primary		Secondary	
X1A	→ Conjunctival xerosis	XN	→ Night blindness / nyctalopia
X1B	→ Bitot spots	XF	→ Fundus
X2	→ Corneal xerosis	XS	→ Scarring
X3A	→ Corneal ulcerat^{n}		
X3B	→ Keratomalacia		

→ First sign → Conjunctival xerosis / Dry Eye
First symptom → Night blindness
First manifestat^{n} → Night blindness
Most specific manifestat^{n} → Bitot's Spots

DRY EYE of vit A deficiency → Receding banks after a seaside

→ Xerophthalmia as a public health problem
1. % of prevalence of night blindness > 1%
2. % of prevalence of Bitot's spots > 0.5%

→ Rx of xerophthalmia

		≥ 1 year	< 1 year	
Day	0	2 lakh IU	1 lakh IU	oral Dose
	1	2 lakh IU	1 lakh IU	
	≥14	2 lakh IU	1 lakh IU	

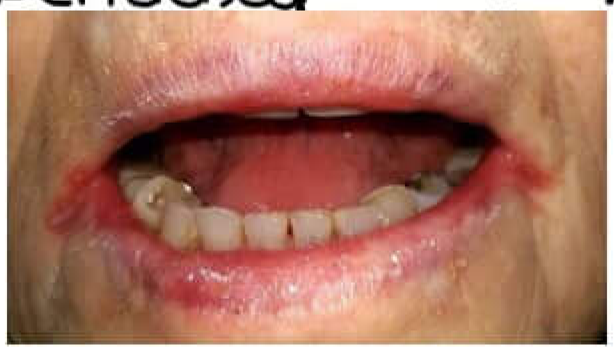
→ 1 Lakh IU = 30 mg
→ Im dose = 1/2 the oral dose

VITAMIN B1 [THIAMINE]

→ Deficiency leads to
1. Beri Beri → Seen in Polished rice eaters
2. Wernicke's Korsakoff Psychosis → Seen in Alcoholics

VITAMIN B_2 – RIBOFLAVIN

→ Deficiency → Ariboflavinosis [Δ]



- Cheliosis
- Angular stomatitis [most characteristic]
- Atrophic Glossitis / Geographic tounge

VITAMIN B_3 – NIACIN

→ Deficiency ⟶ PELLAGRA

- Seen in Maize eating populatⁿ
- $$\underset{60\,mg}{\text{TRYPTOPHAN}} \xrightarrow{\quad\quad\quad} \underset{1\,mg}{B_3}$$
  ↑⊖
  Leucine excess
  [Pellagrogenic AA]

- 3D's
  Diarrhoea
  Dermatitis
  Dementia

4th D – Death
5th D – Delirium
6th D – Depression

VITAMIN B5 – PANTOTHENIC ACID

→ Deficiency leads to BURNING FEET / SOLE SYNDROME

VITAMIN B6 – PYRIDOXINE

→ Deficiency → microcytic anemia
Peripheral neuritis

→ Seen in Isoniazid takers [of RNTCP] → supplement c̄ B6

VITAMIN B9 – FA

→ Deficiency leads to
1. Megaloblastic Anemia
2. Neural tube defects

VITAMIN B12 – CYANOCOBALAMIN

→ Deficiency leads to
1. Megaloblastic anemia
2. Pernicious anemia
3. Peripheral neuritis
4. SCDSC [Sub acute Combined Degeneratⁿ of Spinal Cord]

VITAMIN C – ASCORBIC ACID

→ Deficiency leads to SCURVY
- c/f
  - delayed wound healing
  - Gum bleeding
  - fractures

VITAMIN D – Ergo calciferol [D_2], Cholecalciferol [D_3]

→ Deficiency → RICKETS [children]

Osteomalacia } [Adults]
Osteoporosis }

NUTRITIONAL DEFICIENCIES

→ B_2 deficiency [ocular] → ↑ circum corneal congest^n
→ Zn deficiency → Acro Dermatitis enteropathica
→ vit B6 deficiency → Seizures [infants]
→ vit E deficiency → Progressive external Ophthalmoplegia

→ Chromium deficiency → Glucose Intolerance
→ Zn deficiency Impaired Glucose Metabolism

→ EFA deficiency → PHRYNODERMA [Toad like skin]
→ Selenium deficiency → Endemic Cardiomyopathy of India [KESHAN's DISEASE]

FLUORINE

→ mc source → Drinking water
→ Optimum level of intake → 0.5 – 0.8 ppm
Acceptable level of intake → 1 – 2 ppm
Dental Fluorosis → > 1.5 ppm
skeletal fluorosis → 3-6 ppm
Crippling fluorosis → > 10 ppm

→ Fluorosis d/t excess of Fluorine

Defluoridat^n of water

1. NALGONDA Technique
   - Developed by NEERI NAGPUR [National Environmental ENG. Research Ins.]
   - Sequence
     - L Lime
     - A Alum
     - B Bleeching Powder
2. PHOSPHATES

→ First fluorine changes in body → Upper central Incisors & 1st molar

FOOD STANDARDS & FOOD ADULTERATION

FOOD STANDARDS IN INDIA

NIN, HYDERABAD

1. CODEX ALIMENTARIUS [International]
2. PFA Standards [Preventⁿ of Food Adultratⁿ 1954 Act]
3. BIS Standards [Beuro of Indian Standards]
4. AgMark Standards
5. FSSA Standards [food standards & Safety authority]

→ Indian food standards mainly based on Codex Alimentarius

→ minimum prescribed food Standards in India → FSSA Standards

FOOD ADULTRATION

→ Deliberate additⁿ, deletⁿ or Substitutⁿ (OR) mismatch b/w actual contents & those mentioned on food pockets

FOOD ADULTERATⁿ DISEASES

Disease	Toxin	Adulterant	food
Lathyrism	BOAA [β oxylyl Amino Alanine]	Kesari Dal [L.sativus]	Arhar Dal
Epidemic Dropsy	Sanguinarine	Argemone oil	mustard oil
Endemic Ascietis	Alkaloids [pyrollizidine]	Crotolaria	Food dishes
Ergotism	Ergot toxin	clavicaps	cereals
Aflatoxosis	Aflatoxin	Aspergillus	Ground nuts

ADULTERANTS

→ Blackpepper	→ Dried Papaya seeds
Red pepper	→ Brick powder
Turmeric	→ Lead chromate
coriander powder	→ cow dung

DRIED PUMPKIN SEEDS

Lathyrism

HEALTH ECONOMICS

GDP [Gross Domestic product] → Gross Income Generated every year

NDP [Net Domestic product] → GDP − Depriciatⁿ

GNI [GNP] [Gross National Income / Product] → GDP + Income recieved from abroad

NNP [Net National Product] → GNI − Capital we consume

HEALTH EXPENDITURE

Total, as % of GDP in India → 4.7%

Public, as % of GDP in India → 1.3%

Out of pocket, as % of GDP in india → 3.4%

Real GDP per capita Economic Growth Rate → 5%

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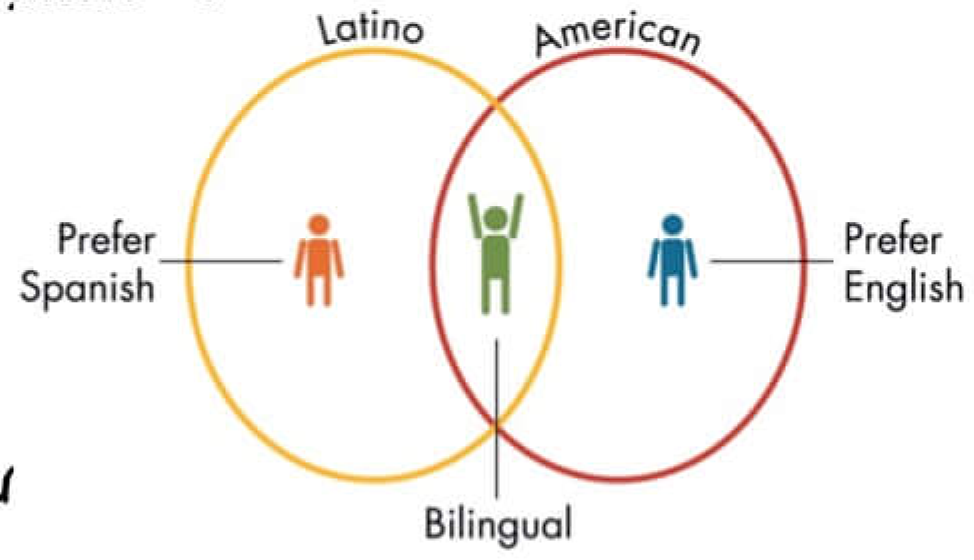
CULTURE → Learned behavior, which is socially acquired [not present from birth]

ACCULTURATION → mixing of 2 cultures [" cultural contact"]
→ occurs by
Educat^{n}
Trade & commerce
Marriage
conquest of one country by another



CUSTOMS → Established patterns of behavior relevant for a particular social setting
→ FOLKWARES → less stringent customs
[less vital areas of conduct]

→ MORES → MORE stringent customs
[PURDAH system]

THEORIES OF DISEASE CAUSAT^{n} in SOCIOLOGY

1. MARXISTTH THEORY → Disease occurs in a society due to putting profit ahead of health
2. PARSONIAN THEORY → Disease occur d/t social constraints which arise d/t social demands
3. FEMINIST THEORY → Disease occur d/t Role of women enforced by men
4. FOUCALDIAN THEORY → Disease occurs so that populat^{n} is seggregated into groups, making them easier to control
5. McKNEOWN THEORY OF TB → whatever reduct^{n} of incidence / prevelance of TB is only d/t socioenvironmental conditions.

PSYCHOLOGY

OPINION → TEMPORARY PROVISIONAL views on any point of debate → SUBJECTIVE
BILIEF → PERMANENT, STABLE, ALMOST UNCHANGEABLE views → SUBJECTIVE
ATTITUDE → MORE OR LESS PERMANENT WAYS OF BEHAVIOR, BASED ON ORGANIZAT^{n} OF BELIEFS ON OBJECT/ PERSON/ SITUATION → OBJECTIVE

HABITS → Accustomed ways of doing things
→ Acquired through repetitions
→ Automatic
→ performed in special circumstances

EMOTIONS → Strong feelings that motivate human behavior
→ mc type emot^{n} → FEAR

LEARNING → Any relative permanent behavior change that occur d/t practical experience

→ Learning Types | Associations

Learning Types	Associations
C Cognitive	K Knowledge
A Affective	A Attitudes
P Psychomotor	S Skills

MENTAL RETARDAT^{n}

→ $\text{IQ level} = \dfrac{\text{Mental Age}}{\text{Chronological Age}} \times 100$

→ IQ < 70 = Mental retardat^{n}

FAMILY SYSTEMS IN INDIA

FAMILY

Family cycle

1. Format^{n}	→ from marriage	till	1st child birth
2. Extens^{n}	→ From 1st child birth	till	last child birth
3. Completed Extens^{n}	→ From last child birth	till	1st child leaves home
4. Contract^{n}	→ From 1st child leaves home	till	last child leaves home
5. Completed contract^{n}	→ from last child leaves home	till	death of 1st spouse
6. Dissolut^{n}	→ from death of 1st spouse	till	death of survivor [Extinction]

FAMILY TYPES

NUCLEAR FAMILY

→ married couple c̄/c̄out dependent children

JOINT FAMILY

→ more than one married couples c̄ their children living in the same house hold

→ common pool of Income ⊕

common Kitchen ⊕

common property ⊕

→ Authority vested in a senior member

3 GENERAT^{n} FAMILY

→ Household c̄ members of 3 successive generat^{n}

→ Type of Joint family

→ Males related by blood [In Joint family also]

NEW FAMILY [RCH]

→ family c̄ marriage durat^{n} < 10 yrs

COMPLEX FAMILY

→ family structure involving > 2 adults

→ Extended family or Polygamy

COMMUNAL FAMILY

→ All members of the family play a defined role in the management of family

→ " DIVISION OF LABOUR "

CONJUGAL FAMILY

→ Nuclear family, where relationships focussed inwardly & ties extended to kin are voluntary

BROKEN FAMILY

→ Both parents are seperated or death has occured of one/both parents

PROBLEM FAMILY

→ Family lags in progress behind rest of the community

→ d/t relationship problems, poverty, Illness

SOCIO ECONOMIC STATUS & SOCIAL SECURITY

SOCIO ECONOMIC STATUS SCALES [SES SCALES]

1. URBAN

→ Modified Kuppuswami scale
→ Kulshrestha Scale
→ Srivastava Scale
→ Jalota Scale

2. RURAL

→ Udai Pareek Scale
→ Modified BG Prasad scale
→ Radhukar scale
→ Shirpurkar scale

3. STUDENT'S SCALE

→ Bharadwaj Scale

4. Non - Indian

→ Hollingshead Scale
→ Henderson Scale

MODIFIED KUPPUSWAMI SCALE

→ Components

Income → Family members
Educatⁿ → Head of Family
Occupatⁿ → Head of family

→ Upper → 26 - 29
Upper Middle → 16 - 25
Lower Middle → 11 - 15
Upper Lower → 05 - 10
Lower → 00 - 04

SOCIAL SECURITY MEASURES for INDUSTRIAL WORKERS in INDIA

→ The Workmen's compensatⁿ Act 1923
The factory Act 1948
The ESI Act 1948
The coal miners provident fund & Bonus act 1948
The Employee's PF Act 1952
The central maternity benefit Act 1961
The family pensⁿ scheme 1971
The Oldage pensⁿ scheme

WATER

SAFE & WHOLESOME WATER

→ free from color/odour
free from chemicals
free from Biological agents
usable for domestic purposes

DISINFECT^n OF WATER

Boiling [Best]
Chlorine [2nd Best]; No effect on
- cyclop
- Polio virus
- Hepatitis A
- Helminth cysts
- Helminth ova
- Bacterial Spores

UV rays
Ozone Gas

→ chlorine → only method having RESIDUAL ACTION

CHLORINATION

→ Cl_2 acts best if pH 7
→ % available Cl_2 in Bleaching powder → 33%
→ gms of bleaching powder is sufficient to disinfect 1000L of water → 2.5gms
→ MOA

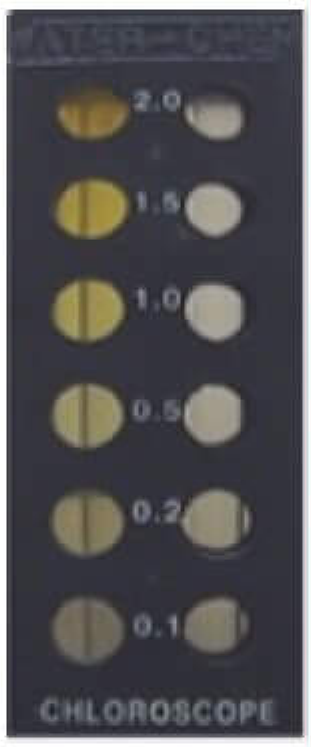
CHLORINE + IMPURITIES
↓
DESTRUCTION ⟶ Add some additional Cl_2 [FREE/RESIDUAL Cl_2]

→ Main disinfecting act^n of chlorine in water is due to HYPOCHLOROUS ACID [HOCl] [90% of disinfect^n] + Hypochlorite ions [10% of disinfect^n]

FREE/RESIDUAL CHLORINE LEVELS RECOMMENDED

1. in drinking water → ≥ 0.5 mg/L → c̄ contact period of 1 hr
2. in drinking water to Kill cyclops → ≥ 2.0 mg/L c̄ contact period of 1 hr
3. Swimming pools of India → ≥ 1.0 mg/L [ppm] c̄ contact period of 1 hr

→ Free chlorine level can be estimated by → CHLOROSCOPE
→ Tests
- OT [ortho Toulidine] Test

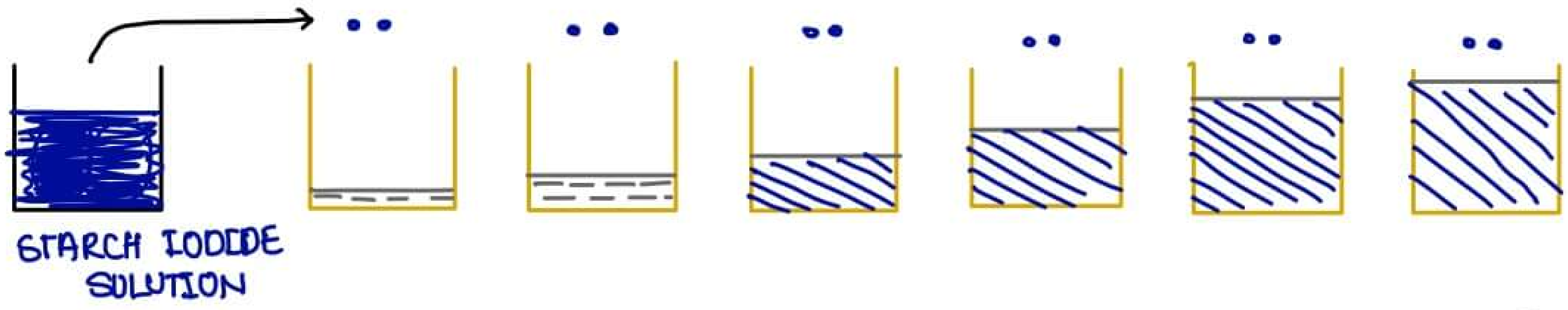


OT TEST	OTA [ortho Tolluidine Arsenite] Test
→ can get levels of	→
01. FREE CHLORINE	01. FREE CHLORINE
02. TOTAL CHLORINE [Directly]	02. COMBINED CHLORINE [Directly]
03. combined chlorine [Indirectly]	03. Total chlorine [indirectly]

→ OTA is better than OT Test
- gives free & combined levels seperately
- not affected by inorganic impurities in water

CHLORINE DEMAND

→ estimated by HORROCK'S Apparatus
→ 6 white cups & 1 black cup
→ indicator → Starch Iodide



→ $(n \times 2)$ gms of Bleaching powder will disinfect 455 L water [n - no. of first cup to show color change]

Q. Grams of bleaching powder required to disinfect 2250 L water, where 3rd cup is the first cup to show color change in Horrock's apparatus

→ n = 3
[3×2] gm required for 455 L water
2250 L requires $= \frac{2250}{455} \times 6 = 30$ gms of B. powder

HARDNESS OF WATER

→ Soap destroying power of water → Hardness

TEMPORARY	PERMANENT
→ d/t Ca^{2+}/ Mg^{2+} salts of Bicarbonates	→ d/t Ca^{2+}/Mg^{2+} salts of Sulphates Chlorides Nitrates

→ softening of drinking water is done if hardness is > 150 mg/L [> 3 mEq/L]

	Temporary Hardness	Permanent Hardness
Removal of Hardness of water	→ Boiling → LIME → $NaCO_3$ → PERMUTIT	→ $NaCO_3$ → Base exchange

PUBLIC HEALTH CLASSIFICATION OF WATER BORNE DISEASES

I WATER BORNE DISEASES

- feco -oral
- • Typhoid • salmonella
  • cholera • E.coli
  • Hepatitis A

II WATER WASHED DISEASES

- inadequate use of water
- scabies

III WATER BASED DISEASES

- Some organism based in water
- Guineaworm Disease

IV WATER BREEDING DISEASES [insect related]

- insect related
- Malaria, Dengue

BACTERIOLOGICAL INDICATORS OF WATER QUALITY IN INDIA

01. Coliforms [E.coli] → Best overall
02. fecal Streptococci → indicates recent contaminat^{n} of drinking water
03. Clostridium perfringes → indicates remote contaminat^{n} of drincing water

Screening Tests of Coliforms in Drinking water

→ Presumptive coliform Test
[MPN multiple Tube method]
- Uses Mc CRADY TABLES

MPN - most propable number

Diagnostic Tests → EIJKMANN TEST

GUIDELINE ASPECTS OF DRINKING WATER QUALITY IN INDIA

→ colour → < 15 TCU [< 5 HAZEN]
→ Turbidity → < 1 NTU
→ Hardness → < 100 - 300 mg/L
→ PH → 6.5 - 8.5
→ TDS → < 500 mg/L
→ Fluorides → < 1 ppm
→ Nitrates → < 45 mg/d
Nitrites → < 3 mg/d
→ Radio Activity → α → < 0.5 Bq/L
→ β → < 1.0 Bq/L

AIR

used to assess

→ Kata Thermometer → Low Air velocity
Hygrometer → Air Humidity
Psychrometer → Air Humidity
Anemometer → Air velocity
Wind vane → Air Directⁿ

HOUSING STANDARDS & VENTILATⁿ STANDARDS

→ Per capita Air Requirement → 300 - 3000 cu. ft / Hour [~ 1000 - 1200 CU FT]
→ Recommended no. of air changes / hr in
  - Living Room → 2-3
  - clinic → 4-6

Types of ventilatⁿ

1. Exhaust ventilation → pushes older air out of the room
2. Plenum ventilation → Pushes fresh air in the room

Balanced ventilation → Exhaust + Plenum Ventilation
Air conditionig

AIR POLLUTION

Indicators
CO_2 CO
SO_2 NO_2
Air pollutⁿ Index
Soiling index
Coefficient of Haze
SPM [suspended Particulate matter]

Overall best Air pollution indicator } SO_2
Overall best chemical Indicator of AP } SO_2
best biological Indicator OF Air pollutⁿ → LICHENS

Air Pollutⁿ monitoring → CPCD [Central Pollutⁿ Control Board]

GLobal warming / Green House effect

major Contributor → 1. water vapour > 2. CO_2

P_4SR

→ Pridictable 4 hr sweat rate
- for comfort Level → 1-3 litres
  max permissible / max P_4SR → < 4.5 ltr

KYOTO PROTOCOL

→ Signed by 187 Countries on 16 feb, 2005
→ includes CO_2 N_2O CFC CH_4 SF_6 PFC

LIGHT

- → minimum illuminat^n level for satisfactory vision → 15-20 foot candles
- → Day Light Factor [DLF]
  - Living Room → ≥ 8%
  - Kitchen → ≥ 10%

SOUND

- → Tolerable sound level to Human ear → < 90dB
- → Auditory fatigue starts → > 90dB
- → Permanent Hearing loss → > 100dB
- → Direct tympanic membrane Rupture → 150-160dB
- → Hospital ward [permissible level] → 22-35 dB
- → Normal conversation → 60-70 dB

HOUSING

HOUSING STANDARDS

- → Floor space per person → > 50 - 100 ft^2 [70-90 ft^2]
- → cubic space per person → > 500 ft^3
- → Doors & windows area → 40% of floor area

overcrowding criteria

- → No. of persons | Room → > 2
- → Floor space | person → < 70-90 ft^2
- → Sex seperat^n > 9 yrs age → Absent

RADIATION

- → Radiat^n exposure in Chernobyl tragedy → Cs, I_2, Sr
- → Thickness of Lead apron to prevent exposure → ≥ 0.5mm
- → State recieves highest Solar Radiat^n → Rajasthan
  - State Utilizing max. Solar Radiat^n → Gujarat
- → Total natural radiat^n recieved by humans → 0.1 rad|p|yr
- → max permissible Radiat^n exposure
  - Man → 5 rad|p|yr
  - Pregnancy → 0.5 rad |p| yr [0.5 REm | 5 msv]

WASTE DISPOSAL

Refuse → solid waste from either living room, or Street or Industry

Garbage → Solid waste from Kitchen

Sewage → Liquid waste c̄ human excreta
→ Fecooral Diseases transmits by Sewage

Sullage Liquid waste c̄out human excreta

SEWAGE

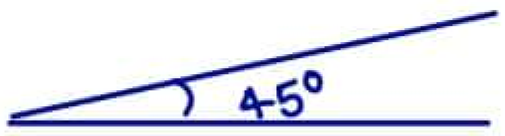
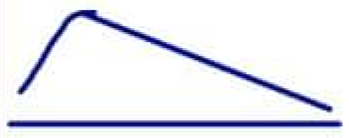
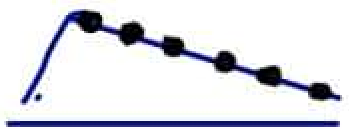
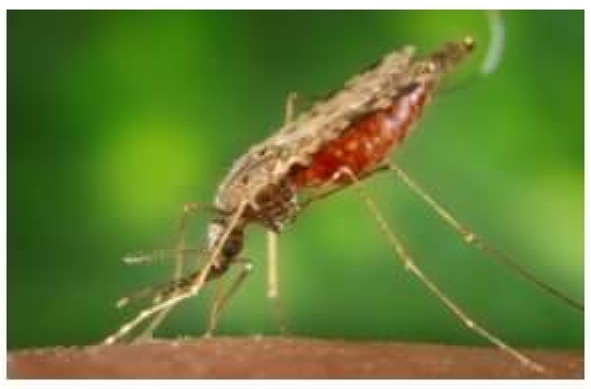
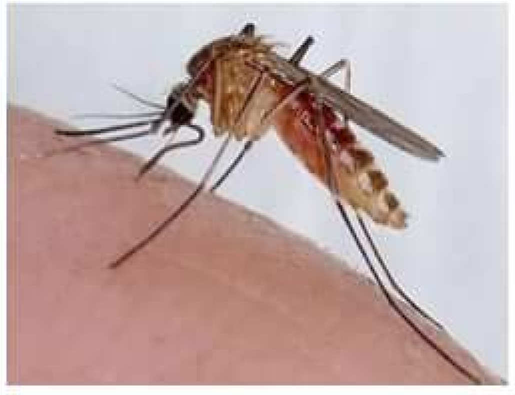
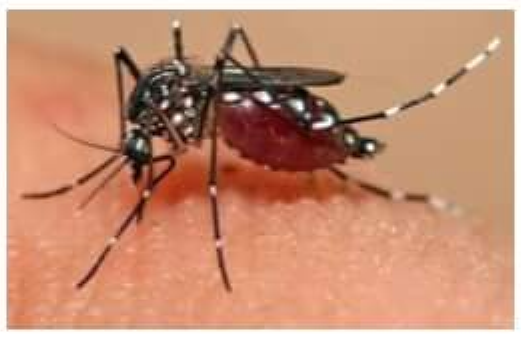
- → Contains 99.9% water
- → Strength assessed by
  1. BOD [Biological O_2 Demand]
  2. COD [Chemical O_2 Demand]
  3. Suspended solids
- → Strong Sewage → BOD > 300

MEDICAL ENTAMOLOGY

VECTORS		DISEASE [S]
Sand fly [Phlebotamus]	→	Kala Azar, Oriental sore, changuinola V, Sicilran V, Oraya fever, Sandfly fever, chandipura V, Naples V etc
Tsetse fly [Glossina]	→	Sleeping sickness of Africa, IOC → DDT
Reduvid Bug [Triatominae] Kissing Bug / Assasign Bug	→	Sleeping sickness of America
Rat flea [xenopsylla]	→	Plague, Endemic typhus, Chiggerosis
Soft Tick	→	Q fever [Animals], only Rickettesial DZ ī out vector – Q fever Relapsing fever, KFD [outside India]
Hard Tick	→	KFD [in India], Tick paralysis, Tick encephalitis Babesiosis, congo fever, Tularemia, Tick Haemorrhagic fever
Louse	→	Epidemic Typhus, Trench fever Relapsing fever, Pediculosis
Black fly [simulum] Flight range ~ 100 miles	→	Onchocerciasis

Anopheles	Culex	Aedes	Mansonia
Malaria	L. filariasis JE west nile fever	Dengue Chickungunya Yellow fever Zika virus Rift valley fever	Brugian filariasis

				breeding habitant
Anopheles	→	Sophisticated Mosquito	→	Clean water
Culex	→	Nuisance Mosquito	→	Dirty water
Aedes	→	Tiger Mosquito	→	Artificial collectn of Rain water
Mansonia	→		→	Aquatic plants

	ANOPHELES	CULEX	AEDES	MANSONIA
Eggs	Boat shaped Lateral Floats	Small Clusters	Single Cigar shape	Star shaped Clusters
Larvae	Rest parallel to water surface [No siphon tube]	Rest at an angle to water surface [Siphon tube present]		Attached to roots of Aquatic plants
Adult	 Sit at 45° Stright body Spotted wings	 Hunch back posture	 Hunchback posture	
Flight Range	3-5 km	11 km	100 m	
				

→ Life span of Mosquito → 8-34 Days

MOSQUITO CONTROL MEASURES

Physical → Source Reduct^{n} → overall best method → Primordial Method
Mosquito Nets → Size of mesh → 0.0475 inch
No. of Holes/sq. inch → > 150

Chemical → DDT
Pyrethrum [Natural]
Malathion [Least toxic]
} Anti Adult measures → Nerve/contact poison
• AChase inhibitors
Paris Green → Anti larval measure → stomach poison
• contains
Cu Aceto Arsenite

Biological → Gambusia → Affinity for Anopheles Larvae
Lebistor
Poecilia
} Larvicidal fishes

→ H14 → Bacillus thuringiensis
→ Coelomyces → Fungus
→ Toxorhynchites → Mosquito

INTERNATIONAL HEALTH

2018 WHD THEME

HEALTH FOR ALL
UNIVERSAL HEALTH COVERAGE: EVERYONE, EVERYWHERE

INTERNATIONAL HEALTH AGENCIES

WHO [WORLD HEALTH ORGANISATION]

→ Established 1945

Constitutⁿ came into force on 7th APRIL 1948 → 7th APRIL - WORLD HEALTH DAY

→ Headquarters located in GENEVA [Switzerland]

→ WHD 2018, 2019 THEME → UNIVERSAL HEALTH COVERAGE

→ Compositⁿ OF WHO

WHO → World Health Assembly
WHO → Executive Board
WHO → Secretariat

WHO LOGO

UNICEF [United Nations International Children Emergency fund / UN Children fund]

→ Headquarters in → New York

→ GOBI - FFF Campaign

G	Growth monitoring	F	family Planning
O	ORS	F	female Education
B	Breast feeding	F	Food Supplementatⁿ
I	Immunizatⁿ		

UNICEF LOGO

ILO [International labour Organisation] → HQ → Geneva

FAO [Food & Agricultural Organisation] → HQ → Rome, Italy

→ FFHC [Freedom from Hunger Campaign]

IRC [International Red cross] → HQ → Geneva → Henry Dunal

DISEASES COVERED UNDER IHRs [International Health Regulations] WHO

1. IMMEDIATELY NOTIFIABLE DISEASES [< 24 hrs]

→ Small pox → Human Influenza
→ Wild Polio → SARS

2. POTENTIALLY NOTIFIABLE DISEASES

2a. PUBLIC HEALTH IMPORTANCE

→ cholera
→ Plague
→ Yellow Fever
→ viral Hemorrhagic Fevers [Ebola, Marburg, Lassa]
→ West Nile Fever
→ Dengue
→ Rift valley Fever
→ Meningococcal Disease

2b. BIOLOGICAL / CHEMICAL / RADIOLOGICAL EVENTS

2c. SERIOUS ILLNESS OF UNKNOWN ORIGIN

DISEASES UNDER TRAINING & RESEARCH

1. malaria
2. filariasis
3. Leprosy
4. Leishmaniasis
5. Trypanosomiasis
6. Schistosomiasis
7. onchocerciasis
8. TB
9. VBD [Dengue, CGF, Zika]
10. Ebola
11. Helminthiasis

LIST OF QUARANTINABLE DISEASES

1. Diphtheria
2. Infectious Tuberculosis
3. Plague
4. Small Pox
5. Yellow fever
6. SARS
7. Viral Haemorrhagic fevers
8. cholera
9. Flu

BIOTERRORISM AGENTS

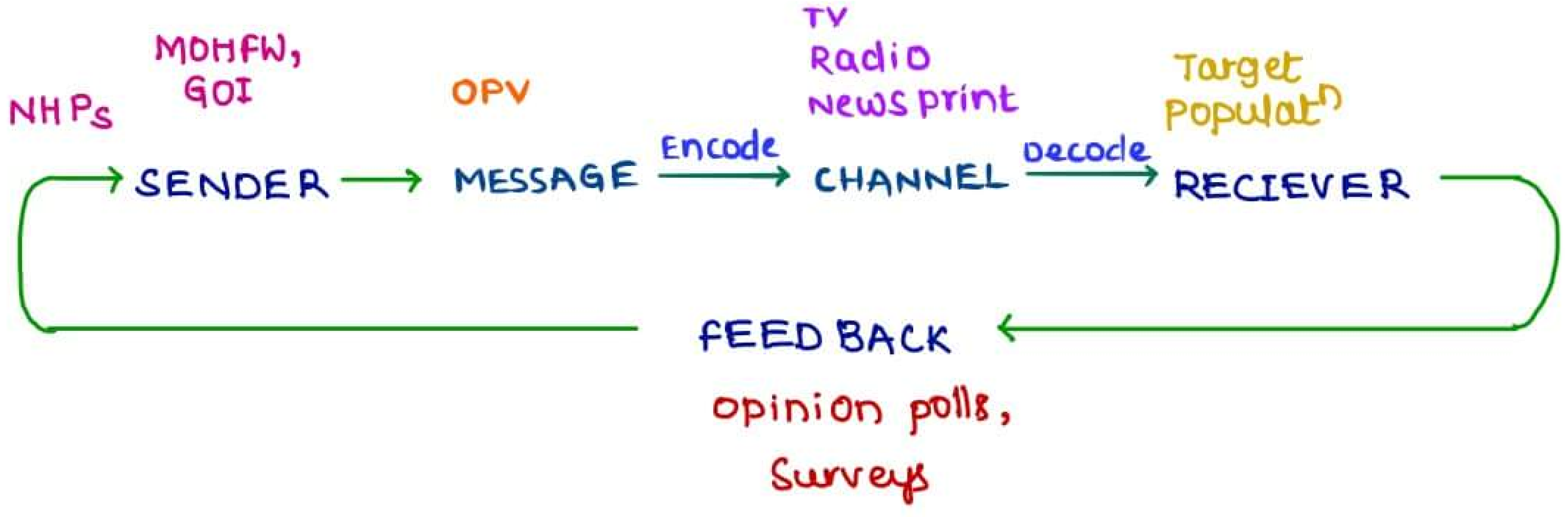
CATEGORY A	CATEGORY B	CATEGORY C
→ most Dangerous	→ Less dangerous	→ New
→ most easy to spread	→ less easy to Spread	→ Emerging
→ 1. Anthrax [mc used]	→ 1. Brucellosis	→ 1. HANTA virus
2. Small pox [most dangerous]	2. melioidosis	2. NIPAH virus
3. Plague	3. Psittacosis	
4. Botulism [most lethal Toxin]	4. GLANDERS	
5. Tularemia	5. STAPH Toxin	
6. Viral Haem. fevers	6. RICIN Toxin	
	7. Q fever	
	8. Epidemic Typhus	
	9. Food safety Threats	
	10. Water safety Threats	
	11. Clostridium perfringes	

Acc to IHR's, Air travel in pregnancy is permitted upto 36 wks POG in Singleton pregnancy
Air travel in pregnancy is permitted upto 32 wks POG in TWIN pregnancy
After 28 wks, should carry EDD certificate [Expected Date of Delivery certificate]

HEALTH COMMUNICATION PROCESS

→ Exchange of Ideas, feeling & informat^{n} in the field of health

→ COMPONENTS



Approaches for Health communicat^{n}

Individual Based	Group Based	Mass Approach Based
Home visits	Lecture	TV
Personal contact	Demostrat^{n}	Radio
	FGD [focus Gr. Discussion]	News Prints
	PD [Pannel Discussion]	Posters
	Symposium	Exhibit^{n}
	work shop	Internet
	conference	
	Seminar	
	Role play	

t.me/latestpandes

HEALTH COMMUNICATION METHODS

01. LECTURE [CHALK & TALK METHOD]

Lecture

→ 1 person addressing audience

→ Group Size [recommended] < 30

Durat^{n} [recommended] < 15-20 minutes

→ Advantage → can cover larger audience in lesser frame of time

→ can communicate more things

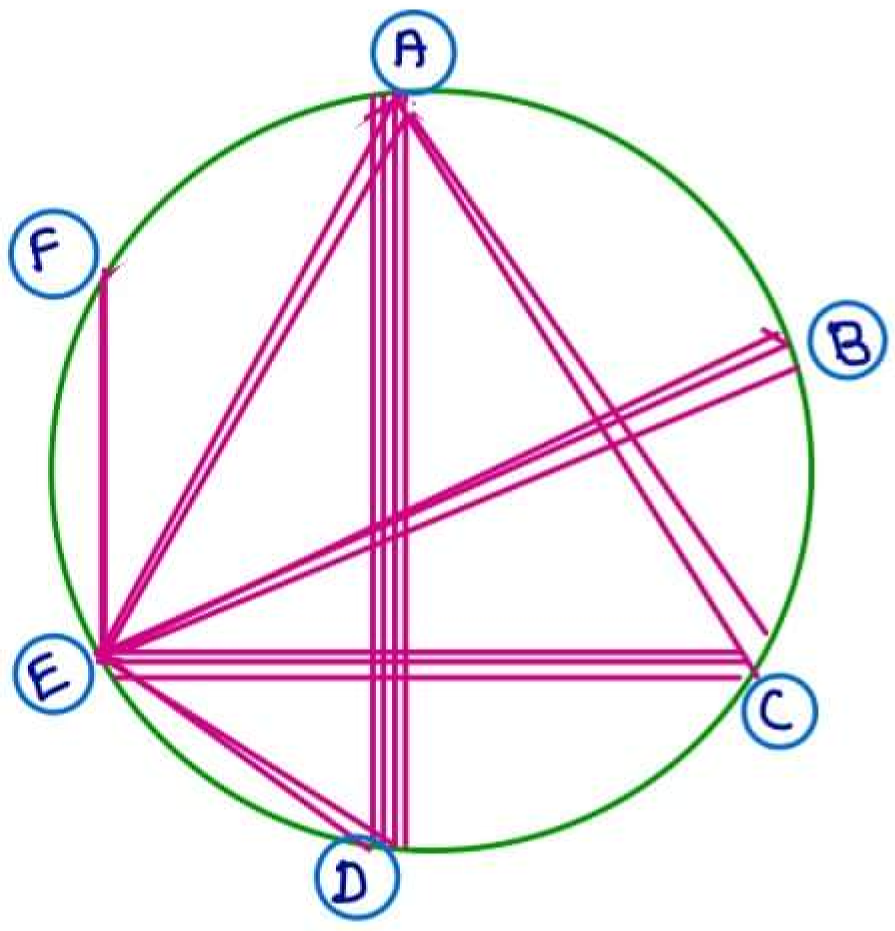
→ Disadvantage → learning is passive

No Q & A [Qustioning & Answering]

02. FGD [Focus Group Discussion]

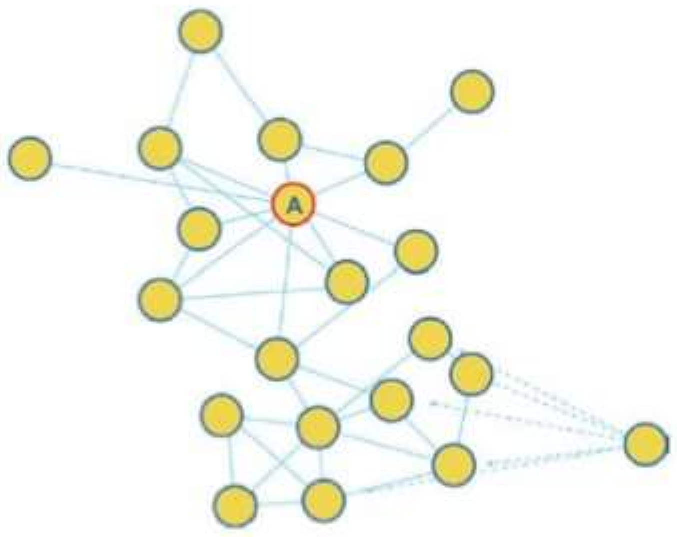
Focus Group Discussion

- → very effective method
- → Discussion on health among 6-12 persons
  - 1 is Group leader
  - 1 is Recorder
    - manual / Electronic
    - has to draw diagram



SOCIOGRAM

- → Interactⁿ b/w participatⁿ in FGD
- → Advantages
  - can make discussion more healthy by promoting/ restricting persons to participate in discussion



SOCIOGRAM

03. PANEL DISCUSSION [PD]

Panel Discussion

- → Discussion among '4-8 experts infront of audience'
- → No specific order of speeches
- → No set speeches
- → News channel discussion → Type of Panel discussion

04. Workshop

- → series of 4-5 meetings 'to impart training or skills' to participants
- → Group work, Group Discussion, Plan of Action
- → Help from consultants & Resource persons taken

05. Symposium

- → 'series of lectures' by 'experts' in front of 'audience'
- → No discussion at all among experts
- → Specific order of speeches +nt.
- → Set speeches +nt.

06. Role Play / Socio Drama → Street Play

- → 'Situatⁿ dramatised' by a group of people infront of audience
- → followed by discussion
- → Ideal audience size → < 25

07. Conference / Seminar

- → combinatⁿ of methods at 'Big / Macro level' [University, State, National level]

08. IPC [Inter Personal Communicat^n / face-to-face / One-to-One Communicat^n]

→ Most effective method even better than FGD

09. Demonstrat^n

→ Principles
- → Seeing is believing
- → Learning by doing

→ Eg – ORS preparat^n

10. FLANNELGRAPH

→ Series of photographs pasted on a piece of cloth in correct chronological Sequence

→ Life cycle of plasmodium [eg]

11. pSPIKE's Technique

→ Communicat^n of cancer Dx & Prognosis

→ p → Protocol of 6 steps

S	Set up interview
P	Perceptions
I	Invitat^n to explain
K	Knowledge
E	Emotions
S	Summary & Starlegy

→ Best used for Breast Cancer

12. Gather Approach

→ used for Contraceptive Counselling in RCH

G	Greet
A	ASK — Permanent Temporary
T	Tell
H	Help
E	Explain
R	Return visit

→ older name → Cafeteria Approach

CLASSIFICATION OF HEALTH COMMUNICATION METHODS

DIDACTIC One Way communicatn	SOCRATIC Two way communicatn
Lecture	FGD
Flannel Graph	PD
TV	Symposium
Radio	Roleplay
News Print	Workshop
Posters	IPC
Charts	Seminar / Conference
Banners	Demonstratn
Pamplet	SPIKES
	GATHER

DOCTOR - PATIENT Communication

Levels ③

1. Intellectual → based on literacy & comprehension of doctor & patient
2. Emotional → Bonding b/w Doctor & patient
3. Cultural → Doctor & patient from same region / Religion / Socioeconomic status

TYPES ④

1. Default → Neither doctor, nor patient has focus
2. Paternilistic → Doctor is dominant
3. Consumeristic → Patient is in focus [seen in Pvt. Hospitals]
4. Mutualistic → Both doctor & patient jointly involved in decision making

HEALTH EDUCATION

HEALTH EDUCATION

→ processes by which individuals & groups learn to behave in a manner which is CONDUCIVE to promotn, maintainance & restoratn of Health [JOHN M. LAST]

Approaches

1. Regulatory Approach / Managed Prevention
   - Coercive / Legislative Approach
   - Successful to a limited extent

2. Service Approach
   - providing health services at door Step
   - limited success
   - Not based on feltneeds

3. Health Educatⁿ Approach

- → slow process but enduring results

4. Primary Health care Approach

- → community involvement
- → Intersectoral co-ordinatⁿ
- → Radically New Approach

Principles

- → credibility
- → Interest
- → Particpatⁿ
- → motivatⁿ
- → Comprehension
- → Reinforcement
- → Learning by doing
- → Known to unknown
- → setting an example
- → Good Human Relations
- → feed back
- → Local leaders involvement

HEALTH EDUCATION	HEALTH PROPAGANDA
→ appeals to REASON	→ appeals to EMOTIONS
→ Thought process ⊕nt	→ No thought process
→ Knowledge & skill actively aqured	→ Knowledge & skills instilled in minds
→ Behavior REFLECTIVE	→ Behavior REFLEXIVE
→ Processes – Behavior centred	→ processes → Informatⁿ centred

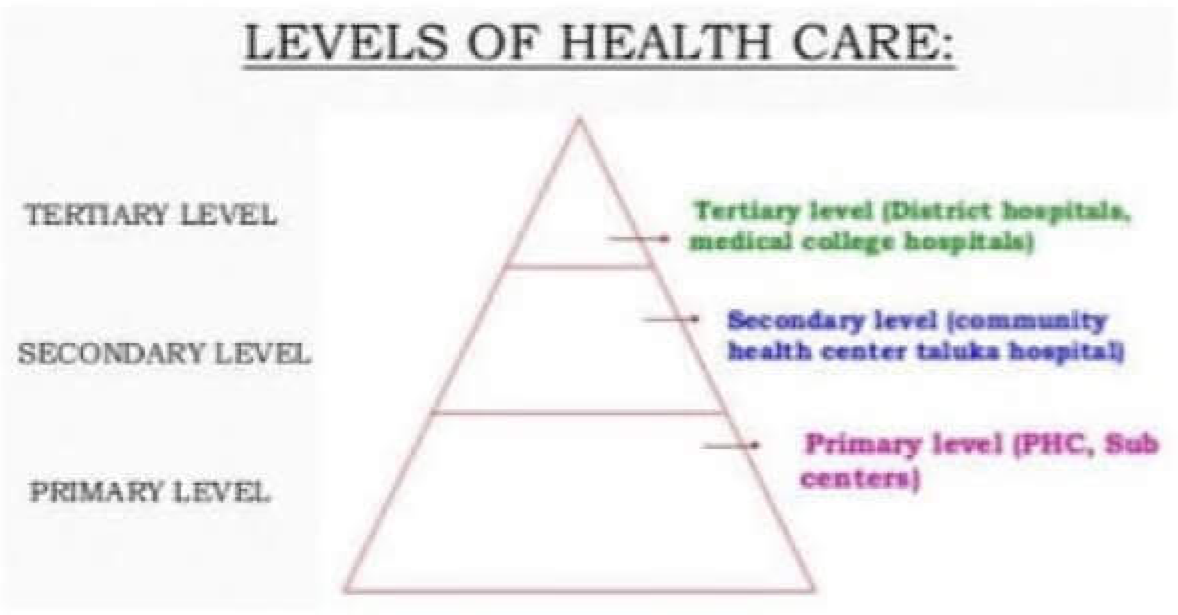
MASS MEDIA

- → Diversified collectⁿ of media technologies intended to reach a mass audience
- → Advantages → reached to large populatⁿ in small time
  even in Lower literacy rate → effective
  Reach remote areas
  Gets attentⁿ
- → Dis Advantages → Mostly one way c
  may not effect change of behavior
- → TV, Radio, News Print, Internet
  Museums, Exhibits,
  folk media
- → TV – most popular / effective
  fastest growing → internet

HEALTH CARE IN INDIA

PRIMARY HEALTH CARE

→ According to ALMA ATA 1978
Essential health care characterized by
A → Acceptability
A → Accessibility
A → Availability
A → Affordability


LEVELS OF HEALTH CARE:
TERTIARY LEVEL
SECONDARY LEVEL
PRIMARY LEVEL
Tertiary level (District hospitals, medical college hospitals)
Secondary level (community health center taluka hospital)
Primary level (PHC, Sub centers)

ELEMENTS OF PH CARE

E → Essential Drugs
- most essential drug → Paracetamol
- 33 – 38 Essential Drugs included in PHC

L → Locally Endemic Disease Preventⁿ & control
E → Educatⁿ [Health]
M → Maternal & child Health [includes FP]
E → EPI 1978 → UIP 1985 [universal Immunizatⁿ Programme]
N → Nutritⁿ
T → Treatment of common ailments
S → Safe water supply & sanitatⁿ

4 PILLARS | PRINCIPLES OF PH CARE

1. Equitable Distributⁿ
   - Social
   - Demographic
   - Economic
2. Appropriate Technology
   - ORS
   - Stand pipes
   - Excl. Breast feeding, KMC [Kangaroo Mother care]
   - ↑RR [Resp. Rate]
3. Community Participatⁿ
   - ASHA
   - Bare foot doctors
4. Intersectoral co-ordinatⁿ

RURAL & URBAN HEALTH CENTRES, WORKERS, NORMS

LEVELS OF PH CARE

→ Tertiary → Second Referral Level | Unit [SRU]

→ Secondary → First Referral level / Unit [FRU]

→ Primary → First contact level b/w populatⁿ & health system of country

HEALTH CENTRES

	Populat^{n} Norms			INFRASTRUCTURE	
	plains	Hilly/Tribal/DTA	BEDS	NUMBERS	STAFF
Tertiary					
MED. colleges & hospitals	—	—	—	500 +	—
Secondary					
CHC	1/120000	1/80,000	30	5,500 +	46-52
Primary					
PHC	1/30,000	1/20,000	4-6	25,000 +	13-21
Sub centres ↓ Central Govt Assisted	1/5,000	1/3,000	ZERO	1,55,000 +	3-4

SUBCENTRES	TYPE A	TYPE B
Delivery	×	✓
HW [m]	1	1
HW[F]/ANM	1	2
Safai Karamchari	1	1
	3	4

MPW = HW

PHC	TYPE A	TYPE B
No. of deliveries/month	<20	>20
MBBS	1	2
AYUSH	1	1
	13-18	14-21

Health assistant ⊕nt at PHC

CHC

→ MD/MS Medical Officers

④	③	②	→ ⑨
Medicine	Ophthalmologist	Dental surgeon	
Surgery	Anesthetist	AYUSH medical officer	
Gyn & Obs	Public health specialist		
Pediatrician			

→ Total → 46-52

→ Health supervisor + nt

Gross Root Level workers

→ ASHA → Acredited Social Health Activist
MPW → Multi Purpose worker
VHG → Village Health Guide [Community Health worker]
TBA → Traditional Birth Attendant [Trained Dai]
AWW → Anganwadi worker

	LOCATION	POPULATION NORM	EDUCATION	TRAINING
ASHA	village	2/1000	10th	23 Days
MPW	sub centre	1/5000	12th	12 months
VHG	village	1/1000	6th	3 months
TBA	village	1/1000	–	1 month
AWW	AWC	1/400-800	10th	4 month

ASHA WORKER [Accredited Social Health Activist]

NRHM 2005-12, NHM 2013 -
25 - 45 years old female worker
Resident of same village

→ Bridge between → village & ANM
→ Selected by → village Panchayat
→ Accountable to → village Panchayat
→ Training by → ANM & AWW
→ Impact indicators → 1. Reduction of IMR [main]
2. TB cases detected
3. Leprosy cases detected
4. PEM rates

URBAN H.CARE SYSTEM → NUHM 2013

Tertiary
Med colleges & Hospitals –

Secondary
UHC → Non-metros 1/2,50,000
UHC → Metros 1/5,00,000

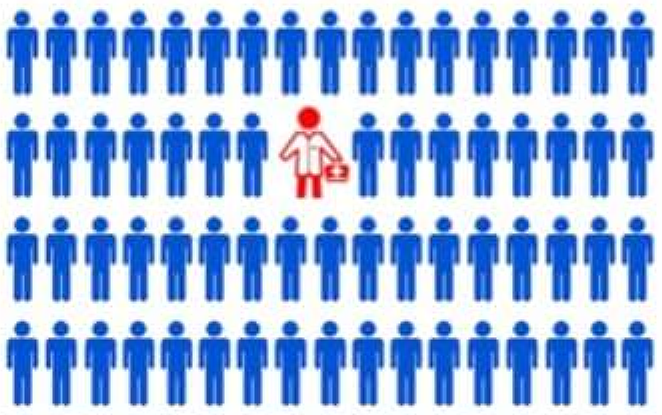
Primary
Urban - PHC [UHC] 1/50,000
No sub centre

USHA [Urban Social Health Activist] → 1/1000-2500
U-ANM → 1/10,000

POPULATION NORMS

	Plain	Hilly
1 Sub centre	1/5,000	1/3,000
1 PHC	1/30,000	1/20,000
1 CHC	1/1,20,000	1/80,000
1 AWC	1/400-800	1/300-800
1 UHC [U-PHC]	1/60,000	
1 U-CHC → Non-metros	1/2,50,000	
→ Metros	1/5,00,000	

1 ASHA	2/1,000
1 MPW	1/5,000
1 VHG	1/1,000
1 TBA	1/1,000
1 AWW	
Plains	1/400-800
Hilly	1/300-800



DOCTOR - POPULAT^n RATIO

1 USHA	1/1000-2500
1U-ANM	1/ 10,000
1 Pharmacist	1/ 10,000
1 LAB Technician	1/ 10,000
1 Health Assistant	1/ 30,000, 1/20,000
1 Health Superviser	1/ 120,000, 1/80,000

1 TB MICROSCOPY	/ 100,000
1 TB UNIT	/ 500,000
1 STLS [Sr. TB lab supervisor]	/ 500,000
1 malaria microscopy	/ 25000
1 SET Centre [Survey Educatⁿ, Rx]	/ 25000
1 ULC [urban leprosy Centre]	/ 50000
1 LCU [leprosy control unit]	/ 450,000

1 Doctor / 1000 populatⁿ
3 Nurses / 1 Doctor
1 ophthalmologist / 50,000 populatⁿ
/ 5 CHC's

AYUSH, SOCIALISED MEDICINE

ALTERNATIVE FORMS OF MEDICINE

→ Earlier Name → ISM & H [Indigenous System of Medicine & Homeopathy]
→ Newer Name → AYUSH

Ayurveda
Yoga & Naturopathy } Indian origin
Unani → Greek origin
Siddha → Indian origin
Homeopathy → Germany
Father → Samuel Hahneman

⊕ SOWA – RIGPA
Chinese, Taiwan system of faith Healing

→ STATE MEDICINE
- free medical care by govt. of a country

→ SOCIALIZED MEDICINE
- free medical care by Govt but regulated by professional groups / bodies
- started in RUSSIA 1978
- Advantages of socialized Medicine
    1. Prevent competitⁿ among Private Practitioners
    2. Provision of Medical services by State Govt.
    3. Social Equity

COUPLE PROTECTION RATE [CPR]

$$\boxed{CPR = \frac{\text{Total no. of Protected couples}}{\text{Total no. of eligible couples}} \times 100}$$

→ CPR India → 54%

→ CPR is a proportion

Effective CPR [ECPR]

$$\boxed{ECPR = \frac{\text{Total Effectively protected couples}}{\text{Total no. of eligible couples}} \times 100}$$

Q Total populatⁿ = 1000

Total EC's = 180

Q ECPR → ?

FP DATA 2001		Effectivity	
condoms	= 29	50%	→ 14.5
OCPs	= 10	100%	→ 10
IUDs	= 10	95%	→ 09.5
vasectomy	= 03	100%	→ 3
Tubectomy	= 08	100%	→ 8
			45

CPR → ?

→ $\frac{60}{180} \times 100 = 33.3\%$

→ $\frac{45}{180} \times 100 = 25\%$

CONTRACEPTIVE FAILURE / CONTRACEPTIVE EFFICACY

I Pearl Index

$$\boxed{PI = \frac{\text{Total no. of Accidental Gestations}}{\text{Total months of exposure}} \times 1200}$$

→ Expressed per Hundred women years [HWY]

Q 100 women use 'C' for 2 yrs each.

10 pregnancies occur. PI → ?

→ $\frac{10}{24 \times 100} \times 1200 = 5$ per HWY

II. Life Table Analysis

→ Expressed as per single woman month of use
→ Better Index

Pearl Index

Male condoms → 2-14 / HWY 14
Female condoms → 5-21 / HWY 21
IUDs → 1-5 / HWY 2
OCPs → 0.1 - 2 / HWY 1
Sterilizatⁿ → ~ 0.1 / HWY
vaginal sponge → 9-20 / HWY

→ more effective is vasectomy than tubectomy

CONVENTIONAL CONTRACEPTIVES

→ used exactly at the time of intercourse
→ Male condoms
Spermicides
- chemical → Non oxynol 9
- MOA → by rupture of plasma membrane of Acrosomal cap

INTRACEPTIVE / Emergency / post coital contraceptives

→ used after intercourse
→ Combined OCPs → Ɛin 72 hrs
POPs → Ɛin 72 hrs → Recommended in RCH
IUD → Ɛin 05 days → most effective [C/I in nulliparous]
RU - 486 [Mifepristone] → Ɛin 72 days
High dose Estrogen → x 5 days

Combined OCPs

→ Yuzpee & Lancee Method
4 pills + 4 pills
$\longleftrightarrow$
12h gap
< 72hrs

POPs

→ 1 pill + 1 pill
$\longleftrightarrow$
12h gap
< 72 hrs

→ progesteron of single pill → 0.75 mg

NATURAL METHODS, BARRIER METHODS, IUDs & OCPs

Natural Methods

→ PI - 60 / HWY

1. Calender Method / fertile period method / safe period method / Rhythm method
2. BBT method
3. Cervical Mucus method
4. Symptothermic method
5. Abstinence → PI = 0 [most effective]
6. coitus Interruptus

Barrier Methods

→ MOA → Barrier b/w sperm & ova

Male condom

	MALE CONDOMES [NIRODH]	Female condomes
PI	→ 2-14 / HWY	→ 5-21 / HWY
HIV protectⁿ	→ +	→ ++
Reusability	→ ×	→ ✓
Material	→ Latex	→ Polyurethane / Nitrile
Length	→ Shorter	→ Longer
No. of Rings	→ 01	→ 02

Female condom

Diaphragm [Dutch cap]

→ used c̄ spermicide

→ reusable

→ 4hrs ← Intercourse → 6hr

→ should be educated ♀ [Temporary spacing]

→ complicatⁿ → Toxic shock syndrome

Diaphragm

Vaginal sponge [Today]

→ used c̄ spermicide [Non-oxynyl 9]

→ 4hr ← Intercouse → 4hr

→ complicatⁿ → Toxic shock syndrome

→ PI → 9-20 | HWY

Chemical methods

→ Foams, Jellies, Spermicides

IUD

Ist Generatⁿ	2nd Gen	3rd Gen
Non medicated / Inert	Medicated / Bio active IUD's	
Lippe's Loop	Copper	Hormones
Grafenberg's Ring	CUT 7	Progestasert
	CUT 220B	LNG - IUD
	CUT 380 A	

CUT 380 A → mc used IUD in india

→ 380 → surface area of Cu in mm^2

→ A → Arm → Ag → CUT 380 Ag

Au → CUT 380 Au

• ↑ Shelf life [5yr → 10yrs] upto 12yrs

PROGESTASERT

→ Rate of progesteron release → 65 μg / Day

→ Total progesteron content → 38 mg → shelf life → 1-1½ yrs

→ mc side effect → Bleeding

Management at PHC – ~~Remove~~

Fe SO_4 200mg TDS × 8 WKS $\xrightarrow{\text{No use}}$ Remove IUD

→ 2nd mc S/E → Pain

Management

- mild analgesics & wait & watch
- Removal of IUD

→ Pregnancy c̄ IUD in situ

management

- Gently remove IUD
- DO medical terminatⁿ of pregnancy

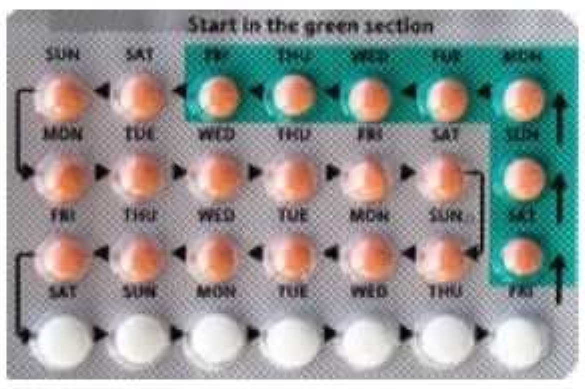
1. Combined OCP's

→ Estrogen + Progesteron

→ MALA N } EE [Ethinyl Estradiol] → 30 mcg → Free

MALA D } Levonorgestrol → 150 mcg → Rs 3/-

Levonorgestrel and Ethinyloestradiol Tablets I.P.
with Ferrous Fumarate Tablets
माला.डी
Mala.D
CONTRACEPTIVE PILLS
For oral use by women



} E + P

→ 60 mg Ferrous fumerate

- maintains continuity
- prevents anemia

Withdrawal Bleeding

Absolute C/I

C Cancer [Breast, Cervical]

L Liver Disease [Adenoma]

U Uterine Bleeding [Excessive & undiagnosed]

T Thromboembolism

C Cardiovascular Disease

H Hyperlipidemia [congenital]

Pregnancy

2. Centchroman / Saheli / CHHAYA [reintroduced]

→ Non steroidal / Hormonal ocp

→ contains ORMILOXEPHENE [SERM]

→ frequency → once a week pill

Twice / week first 3 months

→ Central Drug Research Institute, Lucknow produced it

→ PI → 1.84 – 2.84 / HWY

→ C/I in PCOD

CENTCHROMAN TABLETS I.P.
8 Tablets
CENTCHROMAN TABLETS I.P.
Non-Steroidal Oral Contraceptive Pills
Chhaya
*Twice a week for first 3 months
*Once a Week after 3 months
Government of India
FREE SUPPLY, Not for Sale

3. Progesteron Only Pils [POPs] / Lactatⁿ / Mini / Micropils / INTRACEPTIVE PILLS

4. Quinesterol
   - → once a month pil
   - → No longer used

5. Gossypol
   - → Male pil
   - → made from chinese cotton oil
   - → in 10% causes permanent Azoospermia

Depot formulations

- → Intramuscular injectable Hormones
- → DMPA → Depot medroxy Progesteron Acetate
  - 150 mg im | every 3 months
  - Brand name → ANTARA

ANTARA

NET - EN → Nor Ethisterone Enanthate
- 200 mg im every 2 months

NORPLANT

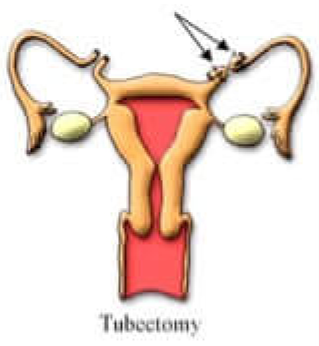
- → Subdermal Implant
- → 6 silastic capsule, 35 mg LNG each
- → Sx procedure for implantatⁿ & removal
- → Shelf Life → 5 yrs

STERILIZATION [NEW GUIDELINES 2014]

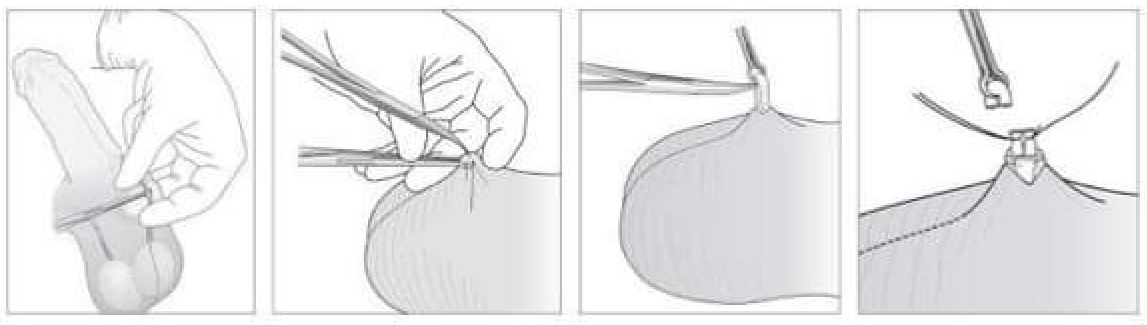
FEMALE STERILIZATION	MALE STERILIZATION
→ married	→ married
→ 22 - 49 yrs old female	→ 22 - 60 years old male
→ ≥ 1 child [> 1 yr age]	→ ≥ child [> 1 yr age]
→ no past history in self / spouse	→ no past history in self / spouse
→ MINILAP - Trained MBBS / MD Gynobs / DGO	→ CONVENTIONAL VASECTOMY - Trained MBBS & above
→ LAPAROSCOPIC STERILIZATION - MD Gynobs / DGO MS surgery	→ NO SCALPEL VASECTOMY [NSV] - Trained MBBS & above

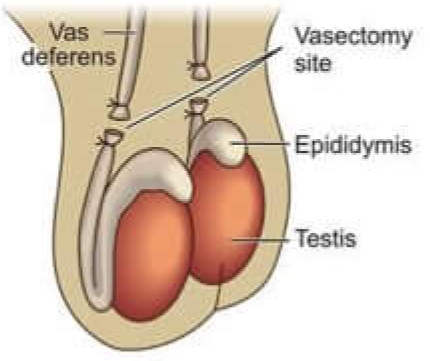
Vasectomy

- → Anatomical structure cut → VAS
- → minimum length of VAS cut → > 1 cm
- → most useful advise post vasectomy → Barrier methods × 3 m
- → mc failure of vasectomy → Surgical mis identificatⁿ of VAS


Tubectomy

- → NSV [NO scalpel vasectomy]
  - NO stich vasectomy
  - small incision
    VAS pulled out
    cut, tie ends & push back
    Small bandage
  - Day care procedure


NO scalpel vasectomy



NEW INITIATIVES IN FAMILY PLANNING

1. HOME DELIVERY OF CONTRACEPTIVES

- → Key health functionary → ASHA
- → Delivery charges
  - ↳ 3 condom pack → RS 1
  - ↳ OCP cycle → RS 1
  - ↳ EC Pill → RS 2

2. MISSION PARIVAR VIKAS [MPV]

- → Accelerate use of FP methods in 1146 high TFR districts

3. ENSURING SPACING AT BIRTH

- → Key health functionary → ASHA
- → counselling charges
  - ↳ First childbirth delayed by 2 yrs → RS 500
  - ↳ 3 yr spacing → RS 500
  - ↳ Opt for sterilization → RS 1000

- → CuT 375 : 5 year effectivity
- → Post partum IUD Insertion
- → Promotion of FP services at district hospital

4. NEWER CONTRACEPTIVES

- → CHHAYA : centchroman [saheli]
- → ANTARA : DMPA

5. FIXED DAY STATIC SERVICES APPROACH [sterilization]

- → DH → 2 / week
- → sub DH [SDH] → Weekly
- → CHC / Block PHC → Fortnightly
- → PHC / 24x7 PHC → Monthly

6. PREGNANCY TESTING KITS

- → NISCHAY
- → Available at ASHA, sub centres

COMMUNICABLE & NON COMMUNICABLE DISEASES

GENERAL EPIDEMIOLOGY

Period of Communicability

C. POX → $2D_{1d}$ ⟵ RASH $\xrightarrow[4d]{}$ 5D
Measles → 4D ⟵ RASH ⟶ 5D
Rubella → 4D before symptoms ⟷ 7 days post rash
Mumps → 4D before Symptoms ⟷ 7 days post rash
Influenza → 1-2D ⟵ Symptoms ⟶ 1-2D
Diphtheria → 14 - 28 D from onset
Pertussis → 7 D post exposure ⟷ 3 wks post paroxysmal stage
Meningococcus → until absent from the nasal | throat discharge
Polio → 7-10 D ⟵ Symptoms ⟶ 7-10 D
Hepatitis A → 2 wks ⟵ Jaundice ⟶ 1 wk
Hepatitis B → Till disappearance of HBs Ag & appearance of Anti HBs Ag
TB → As long as not treated
HIV → Life Long
Tetanus → NONE

Specimens for Diagnosis

TB → Sputum [smear]
Malaria → Blood [smear]
Leprosy → None
HIV → Blood
H_1N_1, Influenza, Diphtheria } Nasopharyngeal secretions
Chickenpox → vescicle fluid [microscopy]
Rabies
- Living person → Biopsy of skin follicles on nape of neck > corneal scrapings
- Dead person → Brain Biopsy
- Living Dog → Brain Biopsy
- Dead Dog → Brain Biopsy

Vertical Transmission — MC Time

Congenital varicella → 1st Trimester
Rubella → 1st Trimester
Syphilis → 3rd Trimester
Toxoplasmosis → 3rd Trimester
CMV → 3rd Trimester
Hep B → 3rd Trimester
Hep C → During Delivery
Herpes V → During Delivery
HIV → During Delivery
Parvo virus → 2nd Trimester

Incubatn Periods

Measles → 10 – 14 Days [10 Days]
Rubella → 14 – 21 Days
Chicken pox → 14 – 16 Days
Influenza → 18 – 72 hrs [1-3 D]
H_1N_1 → 1 – 4 D
Diphtheria → 2 – 6 D
M. Meningitis → 3 – 4 D
TB → weeks – yrs

Hepatitis A → 15 – 45 D [2-6 wks]
B → 45 – 180 D [6w – 6m]
C → 30 – 120 D
D → 30 – 90 D
E → 21 – 45 D [3-6 wks]
Polio → 4 – 33 D [~7 – 14 D]
Cholera → 1 – 2 D
Typhoid → 10 – 14 D
Staph. food poisoning → 1 – 6 hrs

Dengue → 3 – 10 D
Malaria PV → 8 – 17 D 14 D Median IP
PF → 9 – 14 D 12 D MIP
PM → 18 – 40 D 28 D MIP
PO → 16 – 18 D 17 D MIP
L. filariasis → 8 – 16 months
Rabies → 20 – 60 D [3-8 wks]
Yellow fever → 2 – 6 D
JE → 5 – 15 D
Plague → 1 – 3 D
Kala Azar → 1 – 4 months

Trachoma → 5 – 12 D
Tetanus → 6 – 10 D [8 D → 8th Day Disease]
HIV → months – years [10 yrs]
CCF → 1 – 3 D
Ebola → 2 – 21 D
Nipah → 14 – 16 D
Anthrax → 1 – 7 D
Brucellosis → 5 – 60 D
ZIKA → 3 – 10 D
H_7N_9 → 1 – 10 D

CASE → A person c̄ Disease, health disorder or condit^{n}

SUB CLINICAL CASE → Inapparent, covert, missed or abortive case ; organism multiplies BUT DO NOT MANIFEST

CARRIER → Infected person or Animal that harbours Organism in absenc of discernible clinical Disease

Secondary Attack Rate [SAR]

→ $$SAR = \frac{\text{No. of Secondary cases in 1 IP}}{\text{Total susceptibles}} \times 100$$

→ proport^{n} (%)

→ SAR Measles > 90%
Mumps > 86%
C. POX > 90%

→ measure of communicability / infectivity

→ Primary case is excluded from both numerator & denominator

→ IP Measles → 10 – 14 Days
Infect^{n}
vaccine ⟩ Life Long immunity

Ⓠ n = 100, all < 5yrs old. 33 developed measles in 2015 and 33 other got Measles vaccine in 2016. Now, 1 case of measles occur on 01/04/17, 11 more cases developed by 12/04/2017. SAR?

→ $$SAR = \frac{\text{Total no. of sec. cases in 1 IP}}{\text{Total susceptibles}} \times 100$$

$$= \frac{11}{33} \times 100$$

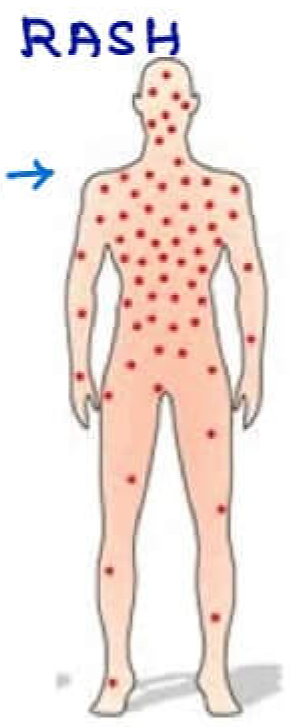
$$= 33.3\%$$

RESPIRATORY INFECTIONS

SMALL POX

→ Causative Agent → variola major [variola minor → ALASTRIM]
Last case in India → 1975
Last case in world → 1977 [somalia]
Eradicat^n → 8th May 1980

CHICKEN POX	S. POX
centripetal	Centrifugal
Pleomorphic	Non-pleomorphic
Dew Drops on Rose petals	
Superficial	Deep seated
Unilocular	multilocular
affects flexor aspects, axilla	affects extensor aspects
Rapid evolut^n	Slow evolut^n



→ cause → HHV - 3 [α] "Varicella"
IP → 14 - 16 D
Source → case
mode of Transmission → Respiratory [Air droplets]
Period of communicability → 2D ⟵ Rash ⟶ 5D
SAR → 90%
vaccine → Live attenuated
OKA strain
Late complicat^n → shingles by Recrudescence

MEASLES

→ cause → RNA Paramyxovirus
→ IP → 10 - 14 D [10 Days]
→ Source → Cases [No carriers - No iceberg phenomenon]
→ mode of Transmission → Respiratory [Air droplets]
→ Period of communicability → 4D ⟵ RASH ⟶ 5D
→ SAR → > 80%
→ Pathognomic CF → Koplik spot [opp. to Lower 2nd molar]
→ CFs → Retroauricular Origin of Rash
→ MC complicat^n → Otitis media [Serous]
→ Late Rare complicat^n → SSPE [sub acute sclerosing Pan encephalitis]
• 7/million cases • after 7-10 yrs
→ vaccine → Live Attenuated
Distilled water - Diluent
9 m & 16-24 m, 0.5ml, S/C in (Rt) Arm
Edmonston Zagreb strain
→ Immunoglobulin → 0.25ml/Kg/Body weight

MUMPS

cause → Myxovirus parootitis
IP → 2-3 wks
Source → case
mode of Transmission → Resp (air Droplets)
Period of communicability → 4-6 D ⟵ symptoms ⟶ 7D
SAR → > 86%
MC complicat^n → Aseptic meningitis [child] [mc]
→ Orchitis [Adolescence]
vaccine → Live Attenuated
Jeryll Lynn strain
mc age group → 5-9 yrs

RUBEOLA → Measles
RUBULA → Mumps
RUBELLA → German Measles

RUBELLA

cause → RNA Togavirus
IP → 14-21 D
Source → cases [No carriers — No Iceberg phenomenon]
mode of Transmission → Resp. [Air droplets]
Period of communicability → 1 WK ⟵ symptoms ⟶ 1 wk after rash
vaccine → Live attenuated
RA 27/3 strain
C/I in pregnancy
1st priority group
- Non Pregnant Non Lactating Reproductive ♀
  15 - 49 yrs ♀

Congenital Rubella syndrome → Triad [1st trimester]
CVD [PDA]
cataract
Sensory Neural Deafness [Early II Trimester]

INFLUENZA

Cause → Orthomyxo virus
Type A [mcc of epidemics] [only cause of pandemics]
Type B
Type C

Type A epidemic — once/ 2-3yrs
Type B epidemic — once/ 4-7yrs
Type C epidemic — once/ 10-15 yrs

MC Type → H_3N_2

SWINE FLU H_1N_1

Avian flu H_5N_1

Avian flu [china 2013] H_7N_9

Antigenic variations	Antigenic Drift	Antigenic shift
	d/t point mutation	d/t genetic reassortment
	gradual	sudden
	EPIDEMICS	PANDEMICS

IP → 18-72 hrs [1-3 D]

→ 1-2D ⟵ Symptoms ⟶ 1-2D

H_1N_1 [Swine flu]

2009, Mexico

Risk factors → child / infants < 2yrs
- Pregnancy
- Old aged > 65yrs
- COPD
- chronic heart Disease
- chronic Renal Disease
- chronic Hepatic Disease
- on Aspirin therapy
- Morbid obesity

Lab diagnosis → RT-PCR [most sensitive

Sample → Nasopharyngeal swabs

DOC → 1. Oseltamivir
75 mg BD × 5 Days
2. Zanamivir

Bird flu, H_5N_1

1997, Hong Kong

DOC - oseltamivir

Bird flu, H_7N_9

2013, china

DOC - Oseltamivir
Zanamivir

Vaccine → Live [Nasal vaccine]

Killed

Strain — A7/california 2009

Priority group
- Pregnancy
- > 6m child chronic disease
- 15-49 yrs adults

REVISED / NEW GUIDLINES ON CATEGORIZATION OF SEASONAL INFLUENZA A H1N1 CASES 2019-20

CATEGORY A	CATEGORY B 1	CATEGORY B 2	CATEGORY C
Mild fever plus cough / sore throat with or without → Body ache → Headache → Diarrhea → vomiting	category A plus → high grade Fever → Severe Sore throat	category A plus children c̄ mild illness c̄ predisposing risk Factors → pregnant women → ≥ 65 yrs of age → Patients c̄ Lung disease / Heart disease / Liver disease / Kidney disease / Blood disorders / Diabetes / Neurological disorders / cancer / HIV / AIDS / Long term cortisone therapy	category A & B plus → breathlessness → chest pain drowsiness hypotension hemoptysis cyanosis children c̄ somnolence High persistent Fever inability to feed well convulsions Shortness of breath difficulty in breathing worsening of chronic disease
TREATMENT GUIDELINES			
NO testing NO Oseltamivir T/t symptoms Home isolation Reassess after 48 hr	Home isolation may need Oseltamivir NO testing required	Home isolation give Oseltamivir no testing required BSA where required	Immediate hospitalizatn Start oseltamivir Send throat swab

BSA : Broad Spectrum Antibiotics

DIPTHERIA

Cause → corynebacterium diphtheriae

Source → carriers [95%] > cases

IP → 2-6 Days

Mode of Trasmission → Resp , Air droplets

Period of communicability → 14-28 D from onset

[Non communicabe is ≥ 2 cultures , 24 hrs apart -ive]

Vaccine → DPT 6, 10, 14 wks

16-24 m

5 yrs

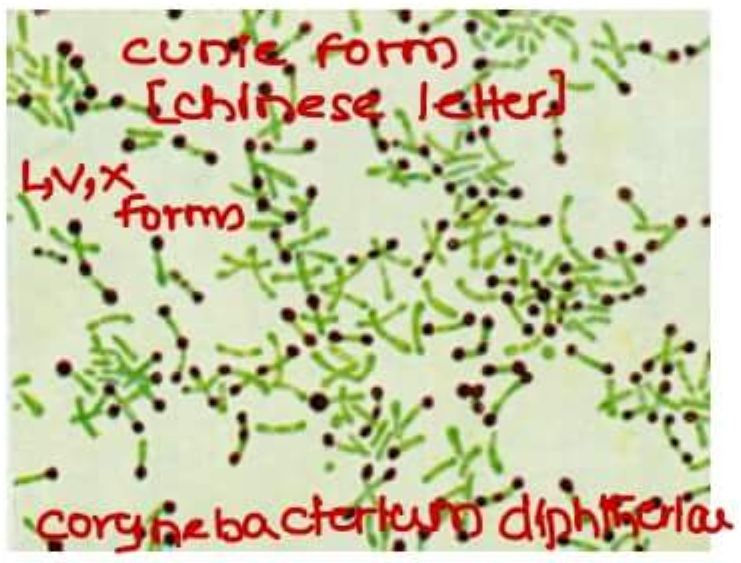
Toxoid

0.5ml im

Carriers as main source

- Diphtheria
- M. Meningitis

Immunity status Test → **SCHICK TEST**



Albert Stain

Intradermal Hypersensitivity Test

0.2ml Shick toxin given

Reading > 96 Hrs

Positive – **susceptible** to Diphtheria

Mx – immediate immunizat^n

Negative – **Immune**, Mx – Nothing

Pseudo +ve – Hypersensitive, immune, Mx – Nothing

Combined – Hypersensitive, susceptible

Mx → **Desensitizat^n**

→ Replaced by Haemagglutinat^n Test

Pertussis / Whooping cough / 100 day cough

Cause → Bordetella pertussis

IP → 7 – 14 days

Source → cases [No carriers, No subclinicals]

SAR → >90%

DOC → Erythromycin

Vaccine → DPT

weakest component

Meningococcal Meningitis / Cerebrospinal fever

Cause → N. Meningitidis [A [mc], B, C, D, 29E, W135, X, Y]

IP → **3-4 D**

Source → **Carriers > cases**

Routes of Transmission → Resp, air droplets

CFR → >80%, c̄ with Dx & Rx → < 10%

DOC

cases → **Penicillin**

Carriers → **Rifampicin**

CHEMOPROPHYLAXIS

< 1 month age → Rifampicin

≥ 1 month age → Rifampicin

< 15 years age → Ceftriaxone

≥ 15 years age → Ceftriaxone, Ciprofloxacin, Rifampicin

Vaccine → Killed cellular fract^n

Not for 'B'

- Not immunogenic

CI in pregnancy & Age < 2yrs

first priority group – **Early Adolescence [10-13yrs]**

ARI Pneumonia

New ARI Guidlines, IMNCI [Integrated Mx of Neonate & child India] 2017-18 [RCH]

NO Pneumonia [Green]

cough/cold

Home

Inhaled Bronchodilator × 5D

Soothe throat

If cough >14 D → TB assess

If wheeze → Asthma assess

follow up in 5D, advise the mother when to return immediately

Pneumonia [yellow]

chest indrawing

fast breathing

RR >50 [2-12m]

RR >40 [12m-5y]

PHC

Oral Amoxycillin × 5D

Inhaled BD × 5D

Soothe the throat

If cough >14 D → TB assess

If wheeze → Asthma assess

follow up in 3 Days, Advise mother when to return immediately

Severe Pneumonia / very sever Disease [Pink]

Stridor in calm child

Any Danger signs

- inabibility to feed
- vomits
- H/O convulsions
- convulsing Now
- Lethargic / unconscious

CHC/Hospital

First dose of referral antibiotic

Diazepam

Rx to prevent Low sugar

Keep the child warm

⇒ Young infant [0-2 months] → Severe/Very S.Dz

Severe chest Indrawings

General Danger Signs

Fast RR >60/min, fever >37.5, Body temp <35.5, No movement, Not feeding convulsn

TUBERCULOSIS / WHITE PLAGE → Barometer of Social welfare in India

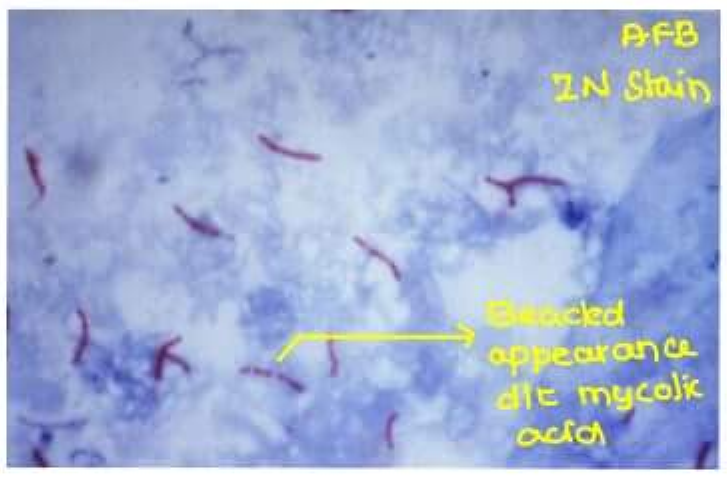
Cause → M. tuberculosis

Source → cases [Human, Bovine]

Period of communicability → As long as not treated

Mode of transmission → Resp, Air droplets

IP → weeks – months – years



EPIDEMIOLOGY OF TB - INDIA

country c̄ highest TB Burden	India
ARI	1.5%
Infected c̄ TB	40%
Developing TB / day	5000/ day
SS +ve per year	0.8 million
Deaths per year	0.37 million
1 case of TB infects / year	10 - 15 persons / year
Incidence of infection [ARI]	1-2% [Tuberculin conversion index]
Prevalence of infection	40% [Tuberculin test]
Incidence / Prevalence of disease	Sputum smear Examination

Immunity Status Test → Montoux Test

Antigen – Purified Protein Derivative
Tuberculin – 50000 TU/mg
Strain – PPD RT-23 $\bar{c}$ tween 80
Dose – 1 TU in 0.1 ml
– ID on flexor aspect of fore arm
Reading – > 72 hrs
[Indurat^n – horizontal max]
>9mm – Positive – Infect^n [current, past]
6-9 mm – Doubtful
<6mm – Negative – Never infected
False ⊕ – BCG high coverage
– Faulty technique
False ⊖ – HIV, immunosuppression,
Pertussis, Measles, chicken pox

Type IV delayed Hypersensitivity

VACCINE → BCG

Live attenuated
Danish 1331 from M.Bovis by 239 serial sub cultures
over 13 yrs
Normal saline – Diluent
At birth,
0.05 ml < 28 days age } ID (Lt) Deltoid
0.1 ml ≥ 28 days age }
0 – 80%
0% against pulm. TB
~ 50% against severe forms
Durat^n → 20 years [not life long]

→ National TB Institute [NTI], Bangalore
TB Research centre [TRC], chennai
National Institute for TB & Respiratory Diseases [NITRD], Delhi

→ MC oppurtunistic infect^n of HIV in India → TB
DM is an independent risk factor for TB

→ MDR TB → Resistance to Isoniazid & Rifampicin

XDR TB → Resistance to
1. INH & Rifampicin both ⊕
2. Any one Fluoroquinolones ⊕
Any one second line injectables
Kanamycin
Amikacin
Capreomycin

→ TB is a propagated epidemic
Anti TB Day → 24 March
Robert Koch → TB Bacillus

→ END TB Strategy

Vision	→	TB free world	
Reduction of TB incidence rate	→	>90%	By 2035
Reductⁿ of Deaths	→	>95%	
TB affected families facing catastrophic costs	→	ZERO	

→ TB Mission 2020
MOHFW, GOI
Eliminate by 2020
1. Free diagnosis & Rx
2. Ban on commercial serology
3. New Anti TB drug
4. Notificatⁿ of TB

POLIOMYELITIS

World → 3 Endemic countries → Pakistan, Afganistan, Nigeria
India → Polio - free on 27-03-2014
Last case → 13-01-2011

Poliomyelitis Distribution

Polio virus
P1 → mcc of epidemics
P2 → Most antigenic
most easily eradicable
MCC of VDPV [Vaccine Derived Polio virus]
P2 Eradication → 20 Sep 2015
P3 → mcc of VAPP [Vaccine Associated Paralytic Polio]
→ P3 Eradication → 17 Oct 2019 [certificate], 24 Oct 2019 [Declaration]

Reservoir → Man
Route of Transmission → feco oral
IP → 4-33D [~7-14D]
Clinical types → Inapparent 95%
Minor / Abortive 4-8%
Non paralytic 1%
Paralytic <1%
VACCINE → OPV SABIN → IPV salk
P1 & P3 [Bivalent]

HEPATITIS

A Enterov 72 [PICORNA V] → 15-45D feco-oral → Mc in children in India
B HepaDNA virus → 45-180D
C Hepaci virus → 30-120D
D Viroids like → 30-90D
} Blood Sexual Parenteral
E Calcivirus → 21-45D feco-oral → Mc in Adults
Mcc mortality in pregnancy

Hepatitis B Serum markers

HBs Ag → 1st Antigen to appear [Austrilia Ag], Epidemiological marker
HBc Ag → Rarely appears alone
HBe Ag → Marker of infectivity, Indicates Active viral replicatn

Anti HBc → 1st Antibody to appear, Marker of Acute Hep B [IgM]
Anti HBe → Marker of good prognosis, Viral replicatn has stopped
Anti HBs → Marker of end of period of communicability
→ Vaccinated individuals

CHOLERA

Cause → Vibrio cholera - ELTOR [Hybrid] - mc subtype in India now
Route of T → Feco-Oral
IP → 1-2D
CF's → Rice watery diarrhoea
Treatment
- Adults → Doxycycline
- Child, Pregnancy } Azithromycin
- Chemoprophylaxis → Tetracycline

Epidemic → 1st step → verificat^{n} of Diagnosis
→ Most imp prophylactic measure is H. Education

TYPHOID

Cause → Salmonella typhi
Route of T → Feco-Oral
IP → 10 - 14 Days
CF's → PEA SOUP Diarrhea
Coated tongue
Rose spots
Step ladder pyrexia

Diagnosis
- B → Blood culture [1st wk] → Best test
- A → Anti Bodies / widal [2nd wk]
- S → Stool culture [3rd wk]
- U → Urine culture [4th wk]

DOC
- Cases → cephalosporins, Quinolones
- Carriers → Ampicillin / Amoxycillin + probenecid x 6wks

Vaccine → Typhoral
Typhim - Vi
TAB

ORS → Medical super discovery of last century

WHO Reduced osmolarity ORS →
NaCl → 2.6 gm — Na^+ → 75
KCl → 1.5 gm — K^+ → 20
Na citrate → 2.9 gm — Cl^- → 65
Glucose → 13.5 gm — Citrate → 10
20.5 gm — Glucose → 75
245 mmol/Ltr

LOW OSMOLARITY
ORAL REHYDRATION SALTS B.P.
ORS
NOVALYTE 4.12g
For the treatment of Dehydration due to Diarrhoea and Vomiting
Orange Flavour
New W.H.O./UNICEF Improved ORS formula
GS

ReSoMal → Rehydration Solution for MAlnourished
Sodium → halved → 45 mmol/L
Potassium → Doubled → 40 mmol/L

SUPER ORS → Rice / Starch / Alanine Based [Not monosugars]

WORM INFESTATIONS

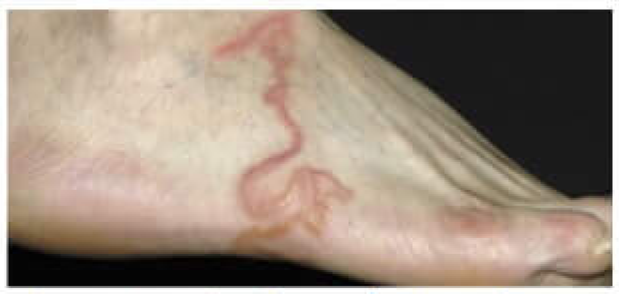
GUINEA WORM

Cause → Dracunculus Medinensis
Last case in India → July 1996 [Jodhpoor] from step well
Eliminatd in India → Feb 2000
Type → Water Based, cyclodevelopmental
Treatment → Niridazole
Mebendazole
Metronidazole

ROUND WORM

Cause → Ascaris lumbricoides
IP → 2 months
Mode of T → Faeco oral
DOC → Albendazole

Mc worm infestat^n in India & world


Larva migrains of Hookworm

HOOK WORM

Cause → Ancylosoma duodenale, Necator Americanus
Mode of T → Penetrat^n of skin of foot
IP → 5 wks - 9 months [A. duodenale], 7 wks [N. Americanus]
Associat^n → IDA → 0.03 - 0.2 ml / worm / Day [~0.1 ml / w / D]
Hypo Albuminemia
Endemic Index → CHANDLER'S INDEX [CI] = No. of eggs / gm stool
Eggs measured by KATOKATZ Technique
CI > 300 → Major Public health Problem

TAPE WORM

Cause → Taenia Solium, T. Saginata
Host → Definitive - Man
Intermediate - Pigs [T. solium]
cattle [T. saginata]
Mode of T → Consumpt^n of contaminated meat
IP → 8-14 wks
DOC → Praziquantel
Niclosamine
[Albendazole - for cysticercosis]

NATIONAL DEWORMING DAY

Dates	10 February & 10 August
Objective	School & pre school children
Beneficiaries	1 - 19 yrs old
Linkage	Vitamin A prophylaxis
Dosage	Albendazole 400 mg Stat → 1/2 tablet [1-2 years age] → 1 tablet [2 - 19 years age]

VBDs, ARBOVIRAL & VIRAL INFECTIONS, SURFACE INFECTION

VECTOR BORNE DISEASES

DENGUE

Classificatⁿ →

ARBO VIRUSES		
Group A	Group B	Others
Sindbis Chikungunya fever	JE KFD Dengue West Nile fever	Sandfly fever Chandipura Ganjam Dhori Minnal

Cause → Group B Arbovirus
- D1 - mc subtype causing dengue
- D2
- D3
- D4

Vector → Aedes aegypti

Reservoir → Man, Aedes

IP → 3 - 10 Days

Diagnosis

Clinically → Torniquet Test
- ≥ 10 Spots → Dengue fever
- ≥ 20 Spots → Dengue haemorrhagic fever

Serological → NS-1 Antigen Test [comes +ive even in 1st week]

Presentation →

Dengue Fever	Dengue Haem. Fever	Dengue Shock Syndrome
Backbone fever	Fever Haemorrhagic features Thrombocytopenia Haemoconcentratⁿ	DHF ⊕ Shock

Global Strategy for Preventⁿ & Control [2012-2020]

→ Reduce Dengue mortality by 50% by 2020

Reduce Dengue morbidity by 25% by 2020

To estimate true Burden by 2015

Vaccine → DENGAVAXIA
- Live Recombinant tetravalent vaccine
- Strain → CYD - TDV
- Recommended Age group → 9-45 yrs
- Schedule → 0, 6m, 12m
- Productⁿ → Replacement of Premembrane and envelop structural genes of YF 17-D strain c̄ Dengue 4 Serotypes

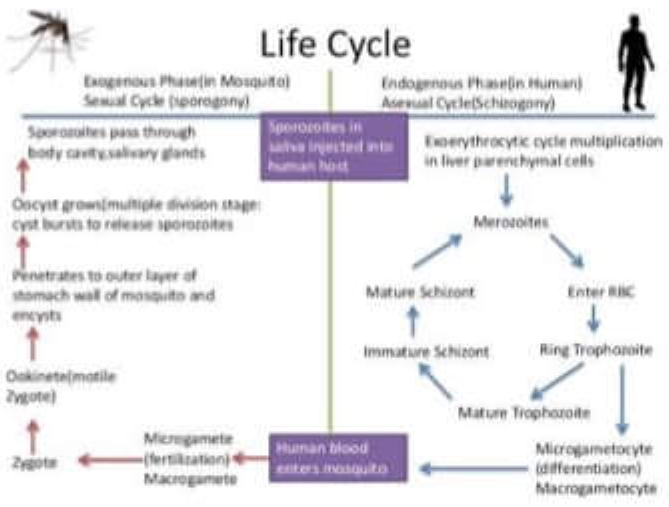
MALARIA

		IP	
Cause →	P. vivax →	8-17D	~ 14 Days
	P. Falciparum	9-14D	~ 12 Days
	P. malariae	18-40D	~ 28 Days
	P. Ovale	16-18D	~ 17 Days

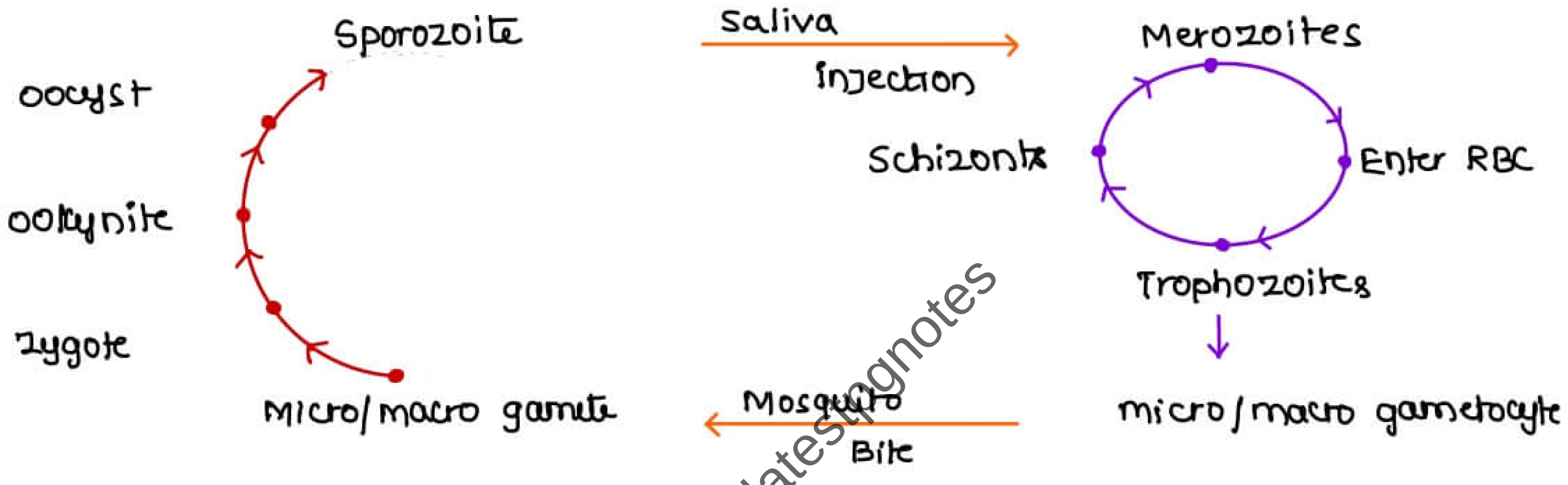
→ mc subtype in India falciparum
only cause of Death - Falciparum

→ No relapse → Falciparum & Malariae [Recrudescence present]

→ Infective form → Sporozoite


Life Cycle
Exogenous Phase(in Mosquito)
Sexual Cycle (sporogony)
Endogenous Phase(in Human)
Asexual Cycle(Schizogony)
Sporozoites pass through body cavity,salivary glands
Sporozoites in saliva injected into human host
Exoerythrocytic cycle multiplication in liver parenchymal cells
Oocyst grows(multiple division stage: cyst bursts to release sporozoites
Merozoites
Penetrates to outer layer of stomach wall of mosquito and encysts
Mature Schizont
Enter RBC
Immature Schizont
Ring Trophozoite
Ookinete(motile Zygote)
Mature Trophozoite
Zygote
Microgamete (fertilization) Macrogamete
Human blood enters mosquito
Microgametocyte (differentiation) Macrogametocyte

SPOROGONY	SCHIZOGONY
Sexual cycle	Asexual cycle
Exogenous phase	Endogenous phase
Mosquito	Man



Vector →	Anopheles culicifacies	[Rural]
	Anopheles stephensi	[Urban]

FILARIASIS

	LYMPHATIC FORM	BRUGIAN
Cause	Wuchereria bancrofti	Brugia malayi
Vector	Culex quinquefasciatus	Mansonia
DOC	DEC [Di Ethyl carbamazene] → 6mg / kg x 12 Days	

→ Ideal time for blood collection → 8.30 pm to 12 Am midnight

GLOBAL PROGRAM TO ELIMINATE LYMPHATIC FILARIASIS [GPELF] [WHO]

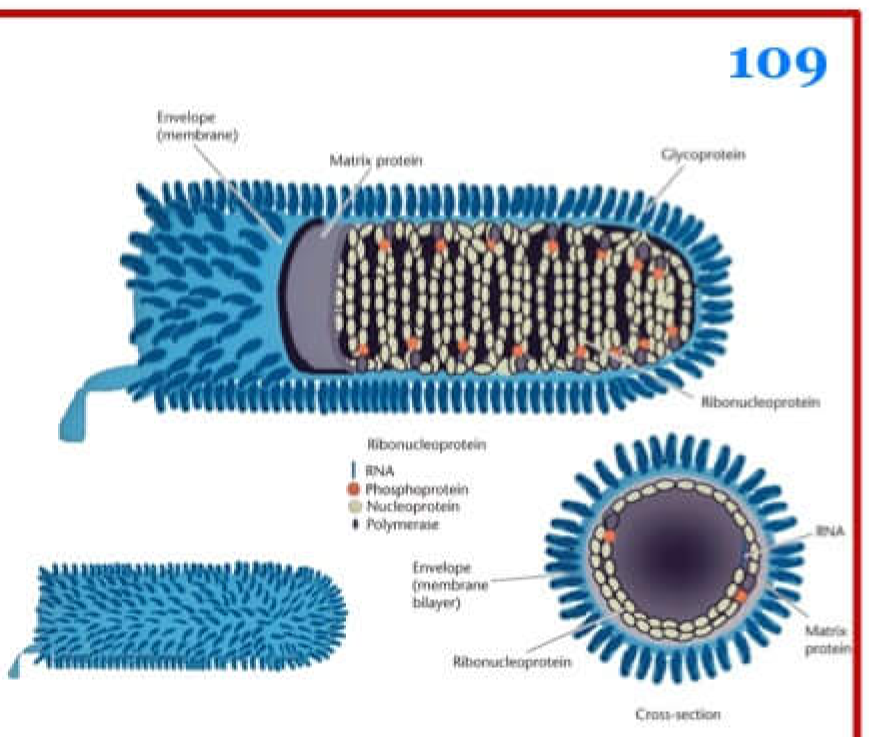
1. STOP THE SPREAD OF INFECTION → MASS DRUG ADMINISTRATION [MDA]
   - → Diethylcarbamazine citrate [DEC] + Albendazole or
   - → Ivermectin + Albendazole

2. ALLEVIATE SUFFERING → Morbidity Management & Disability Prevention [MMDP]

ACCELERATED PLAN FOR ELIMINATION OF LYMPHATIC FILARIASIS [APELF], INDIA 2018

→ Triple drug therapy or IDA [Ivermectin, DEC, Albendazole]
→ community engagement for successful MDA implementation
→ DEC medicated salt
→ House - to - House visit Advocacy

RABIES



RABIES VIRUS

cause → Lyssavirus 1 [Rhabdo virus family]

IP → 20 - 60 Days

Pathognomic

CP → Hydrophobia

MF Negri bodies in hippocampus

Mode of T. → Animal Bites except human & rat bite

Barrier → Water

Local wound Rx → Soap & running water for 5-10 min
No sutures generally

VACCINES → developed from fixed virus type
- PCECV - Purified chick Embryo cell vaccine
  - RABIPUR , VAXORAB
- PVRV - Purified verocell vaccine
  - VERORAB, ABHAY RAB, INDIRA

Anti Rabies serum → HRIG - Human Rabies ImmunoGlobulin - 20 IU/kg
ERIG - Equine Rabies ImmunoGlobulin - 40 IU/kg

YELLOW FEVER / AMERICAN PLAGUE

cause → Flavivirus Fibricus

Reservoir → Monkeys , Man , Aedes

IP → 2 - 6 Days - Quarantine period

CFR → 80%

Vaccine → Live Attenuated
Strain - 17 D
Diluent - cold physiological Saline
temp - $-30°C \longleftrightarrow +5°C$
Validity of certificate - 10 Days to life long

Indices of Surveillance →
1. Container Index = $\frac{C^+}{C} \times 100$
2. House Index [Aedes aegypti Index] = $\frac{H^+}{H} \times 100$
3. Breteau Index = $\frac{C^+}{H} \times 100$

C = containers
+ = breeding

YF control measures →
1. Area around airport kept free of aedes > 400 m
2. Breteau index < 1%

EYE [Elimination Yellow Fever Epidemic] STRATEGY [WHO, UNICEF, GAVI]

→ Project at - risk population
→ Prevent international spread of YF
→ Contains outbreaks rapidly

Japanese Encephalitis

Cause → Group B Arbovirus
Vector → Culex trileniorhynchus [mc in india]
Amplifier Host → Pigs
Actual Host → ARDIED BIRDS [Ducks, fouls]
Accidental Host → Man
Mosquito Attractants → Cattle | Horses
IP → 5 - 15 D
CFR → 30
Age Group → 1 - 15 yr
Vaccines → Live Strain – SA - 14 - 14 - 2 at 9 m, 16-24 months
Killed Strain – Nakayama, Beijing P_3 [earlier]

KFD / Kyasanur Forest Disease | Monkey Disease

Cause → Group B togavirus
Reservoir → Rats, Squirrels
Amplifier host → Monkeys
Accidental host → Man
Vectors → Hemophysalis spinigera → Hard tick [in India]
→ Soft tick [out side India]
IP → 3-8 days
Vaccine → Killed vaccine

Plague

Cause → Yersinia pestis
Reservoir → Wild rodent [Tatera indica]
Vector → Rat flea [Xenopsylla cheopsis – most efficient in India]
Source → Rats → Bubonic & Septicemia
→ Man → Pneumonic
Mode of T → Rat flea Bite or Air droplets
Types → Bubonic → 2-7 days → most common
Pneumonic → 1-3 days
Septicemic → 2-7 days

DOC
cases → Streptomycin
chemoprophylaxis → Tetracyclin

RICKETTSIAL DISEASES

		Cause	Vector	Reservoir
Typhus Group	Epidemic Typhus	R. Prowazeki	Louse	Man
	Endemic Typhus	R. Typhi	Flea	Rodents
	Scrub Typhus	R. Tsutsugamushi	Trombiculid Mite	Rodents
Spotted Fever Group	Indian Tick Typhus	R. conori	Tick	Rodents
	RMSF	R. rickettsii	Tick	Rodents
	R. Pox	R. Akari	Mite	Rodents
	Q Fever	Coxiella	⊘	cattle
	Trench fever	Bartonella	Louse	Man

DOC → Tetracycline

BRILL ZINSER DISEASE → Recrudescence of Epidemic Typhus

LEISHMANIASIS

VISCERAL / KALA AZAR	CUTANEOUS / ORIENTAL SORE / Delhi boil / Bagdad boil	MUCOCUTANEOUS
L. Donovani Sand fly [Phlebotamous]	L. tropica Sand fly	L. Braziliences Sand fly [DDT IOC]

IP → 10 D → 2 yrs [~ 1-4 months]

Serological Dx → rK 39 Ag & ELISA, DAT, IFAT

Immunity status test → Montenegro Test
- Leishmanin Antigen used
- Reading after 48-72 hrs

DOC → LAMB [Liposomal Amphoterician B]

TRACHOMA / ROUGH EYE → Free on 8-12-2017

Cause → Chlamydia trachomatis

IP → 5-12 days

Mode of T. → fomites, flies, Sexual

Field Diagnosis [≥ 2 out of 4] → Follicles on upper tarsal Conjunctiva
Limbal follicles [Herbert pits]
Pannus
Conjunctival Scarring

WHO Classificatⁿ
- TIF [Trachoma Inflammatⁿ follicular] → ≥ 5 large follicles on upper tarsal Conj
- TII [Trachoma Inflammatⁿ Intensity] → > 50% of Deep tarsal vessels of UTC covered

DOC → Azithromycin

Mass Treatment if prevention of moderate/severe trachoma in < 10 yrs age is > 10%.

Tetanus

Cause → Clostridium tetani
Source → Soil
Reservoir → Soil
IP → 6-10 days
Period of Communicability → None
NNT Eliminat^n Criteria (14 July 2016) →
1. Rate < 0.1 case / 1000 LB
2. Coverage TT > 90%
3. Attended deliveries > 75%

CATEGORY	Clean wound <6H	Other wounds
Ⓐ CC <5yrs	Nothing	Nothing
Ⓑ CC 5-10yrs	1 Dose	1 Dose
Ⓒ CC >10yrs	1 Dose	1 Dose + TIG
Ⓓ Not CC unknown	Complete course	Complete course + TIG

CC – complete course

LEPROSY, HIV & STDS

LEPROSY / HANSEN'S DISEASE

Cause → Mycobacterium Leprae
Mode of T. → Air Droplets, Skin Contact, Transplacental, Breast feeding, Insect bite, Tattoo, Corneal, Organ transplantat^n

Epidemiology INDIA
ANCDR [Annual New Case detection Rate] → 9.27 / 1,00,000
Prevalence → 0.67 / 10,000
Eliminat^n level Dec 2005 → <1 case / 10,000

RIDLEY JOPLING CLASSIFICATION

TT	→	Highest CMI +++++ Lepromin test	Pauci Bacillary
BT	→	MC in India	Paci Bacillary
BB			Multi Bacillary
BL			Multi Bacillary
LL	→	Highest Bacillary load Most Infectious	Multi Bacillary

→ Immuno histological classificat^n
→ First sensat^n lost → cold temperature
→ Treatment → MDT [multi drug Therapy]

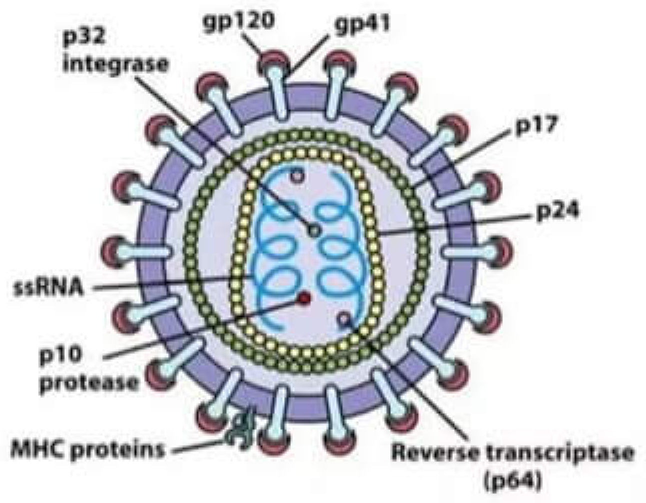
→ oldest disease known → Leprosy
oldest disease c̄ a known cause → Scabies
Oldest bacterial disease c̄ a known cause → Anthrax

→ Leprosy can't be Eliminated
1. No proper vaccine
2. No artificial culture media
3. Long & variable incubat^n period - most imp. reason
4. Multiple routes of transmission

→ Global Leprosy strategy 2016 - 2020
1. No. of children Dx c̄ leprosy → Zero
2. No. of newly Dx patients c̄ deformity → < 1%
3. No. of countries allowing discriminat^n → Zero

HIV / AIDS

Cause → HIV [HTLV - III, Lymphadenopathy associated virus]
Mode of T → Sexual → mc mode [>90%]
least efficient route [<0.01 - 0.1%]
Blood → Least common mode [<0.5%]
Most efficient route [>90% chances]
Needle | Syringes
vertical



Prevalence → 0.22%
MC age group → 30 - 44 yrs

→ 1st case → 1981 - USA
HIV virus → 1983 - HIV 1 discovery
1986 - HIV 2 discovery
} Robert Galo -
Montagnier - Sinnousi
Got NOBEL PRIZE

→ 1st case India → Chennai 1986
Highest cases → Maharastra
High Prevalence → Tamilnadu, Maharastra, Andhra, Karnataka, Manipur, Nagaland, mizoram

Moderate prevalence → Gujarat, GOA, Pondicherry
Highest prevalence state → Mizoram [2%]
Fastest increasing → Andhra Pradesh
Highest prevalence city → Mumbai
mc route in Manipur → Inj. Drug users

STATES	HRG [High Risk Group]	ANC [Antenatal clinic]	Districts
High Prevalence	>5%	>1%	A
Moderate Prevalence	>5%	<1%	B
Low prevalence	<5%	<1%	C
Poor Data or Low prevalence in Last 3 yrs			D

→ Mother to child transmission Rate → 30%
MTCT through Breast feeding → 12-16%
In Developing countries Breast feeding is not CI except in Higher Socio Eco. ♀

MC Oppurtunistic infect^{n} in World → Pneumocystis carini Pneumonia
[Pneumocystis jiroveci pneumonia]
MC oppurtunistic infect^{n} in India → TB [upto 40% Co-infect^{n}]

UNAIDS 90-90-90 TARGET

- → Reaching 90-90-90 in 2020 means ending the AIDS epidemic is possible by 2030
- → An ambitious but achievable target for HIV treatment by 2020

→ 90% of people living ī HIV know their status
90% of those who test positive have access to treatment
90% of people under treatment have an undetectable viral load

UNAIDS 95-95-95 TARGET

- → Reaching 95-95-95 in 2024 means ending the AIDS epidemic is possible by 2030
- → An ambitious but achievable target for HIV treatment by 2024

→ 95% of people living ī HIV know their status
95% of those who test positive have access to treatment
95% of people under treatment have an undetectable viral load

OTHER STIs

	IP	CAUSE
Syphilis	9-90 Days	Treponema pallidum
LGV	3-12 Days	Chlamydia trachomatis
Donovanosis	3-21 Days	Calymmatobacterium granulomatis
Chanchroid	3-5 Days	Hemophilus ducreyi
Gonorrhoea	1-5 Days	Neisseria gonorrhaeae

CASE DETECTION IN A STD CONTROL PROGRAMME

- → Screening
- → Contact tracing
- → Cluster testing

SURAKSHA CLINIC

- → Blood sample testing
- → Counseling
- → Syndromic case management [RTI/STI/ RPR Kits]

STD COLOUR CODED KITS

KIT	COLOUR	SYNDROME	CONTENTS
1	Grey	urethral | Anorectal | cervical discharge / SS #	Azithromycin, cefixime
2	Green	vaginal discharge	secnidazole, Fluconazole
3	White	Genito - ulcerative disease [non - herpetic]*	Azithromycin, Benzathinpenicillin
4	Blue	Genito - ulcerative disease [herpetic]	Azithromycin, Doxycycline
5	Red	Lower abdominal pain	Acyclovir
6	Yellow		cefixime, metronidazole, Doxycycline
7	Black	Inguinal bubo	Azithromycin, Doxycycline

TREPONEMATOSIS

	SYPHILIS	YAWS	PINTA
cause	T. Pallidum	T. pertenue	T. carateum
Route	Sexual / venereal	Direct skin contact	Direct skin contact
DOC	Benzathine Penicillin G	Benzathine Penicillin G	Benzathine Penicillin G

→ Yaws eliminated from India in July 2016

OTHER COMMUNICABLE DISEASES

ZOONOSES

ANTHROPOZOONOSES → from animal to man
Rabies, Plague, Anthrax, Echinococcosis

ZOO ANTHROPONOSES → from man to animal
Human TB in cattle

AMPHIXENOSES → Either direction
Trypanosoma cruzi, Schistosoma japanicum

1 Direct zoonoses → occur through Direct contact / fomite / mechanical vector
Rabies, Brucellosis

2 Cyclo zoonoses → involvement of >1 vertebrate species
Taeniasis, Echinococcosis

3 Meta zoonoses → involvement of invertebrate vector
Plague, Arboviral Diseases

4 Sapro zoonoses → Non animal reservoir
Larva migrans, Mycoses

FOOD POISONING

IP

1 Staphylococcal FP → 1 – 6 hrs

2 B. cereus FP [emetic] → 1 – 6 hrs

3 B.C. FP [non emetic] → 12 – 24 hrs

4 Cl. perfringes FP → 6 – 24 hrs

5 Salmonella FP → 12 – 24 hrs

6 Botulism FP → 12 – 36 hrs

Emerging & Re emerging Diseases

1. CCF [Crimean Congo fever]

Cause → Nairo virus [Bunya virus]

Vector → Hyaloma [Hard Tick]

IP → 1 – 3 days

CFR → 30 %

DOC → Ribavirin

2. NIPHA

Cause → Henapi virus

Mode of T → consumptn of fruits c̄ bat's secretions

3 SARS / MERS

→ by Corona virus

4 EBOLA

IP → 2 – 21 Days

Route of T → contaminated Body fluids, Sexual

5. ZIKA

Route of T → Aedes aegypti, MTCT, Blood, Sexual

Diagnosis → RT PCR Technique

6. LITCHI VIRUS DISEASE

Hypoglycemia in empty stomach PEM child

Chemical → MCPG

CHD

Prudent Diet

→ Overall Goal is to reduce $\frac{\text{CHOLESTEROL}}{\text{HDL}}$ Ratio → < 3.5

→ Dietary goals

1. Reductn of fat intake → < 30%
2. Reductn of Saturated fat intake → < 7%
3. Reductn of salt intake → < 5g / Day
4. Reductn of cholesterol intake → < 200 mg / Day
5. ↑ complex carbohydrates consumptn
6. Avoid alcohol

NON MODIFIABLE RISK FACTORS

1. Age [Peak Age 51-60 yrs India]
2. Sex [M > F India]
3. Family History
4. Genetic Factors
5. Personality type A

MODIFIABLE RISK FACTORS

1. Smoking
2. High BP
3. Elevated S. Cholesterol
4. DM
5. Obesity
6. Sedentary Life style
7. Stress

→ Most Direct Associatn → LDL

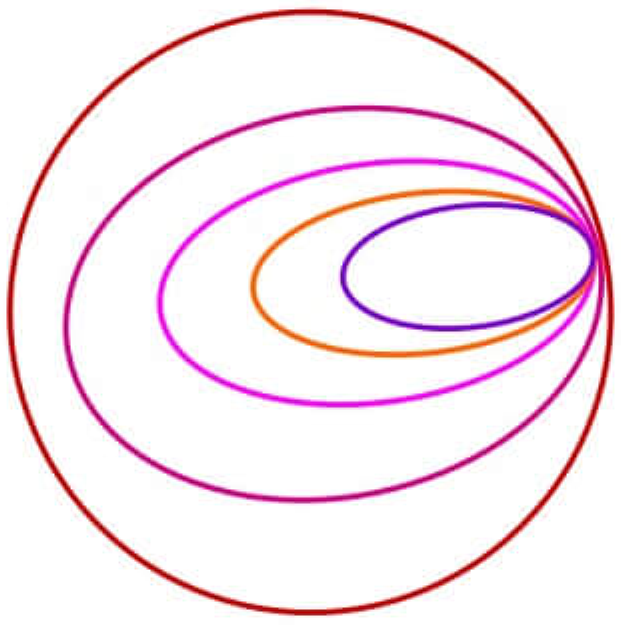
PREVENTION & CONTROL

1. LDL level → < 100 mg / dl
2. HDL level → > 40 mg / dl
3. Serum cholesterol level → < 200 mg / dl

HYPERTENSION

RULE OF HALVES

→ Only shown by HTN



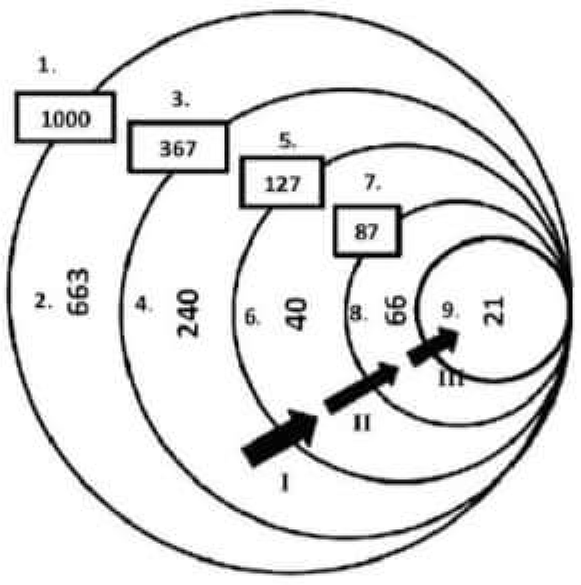
Total Populatn

50% HTN

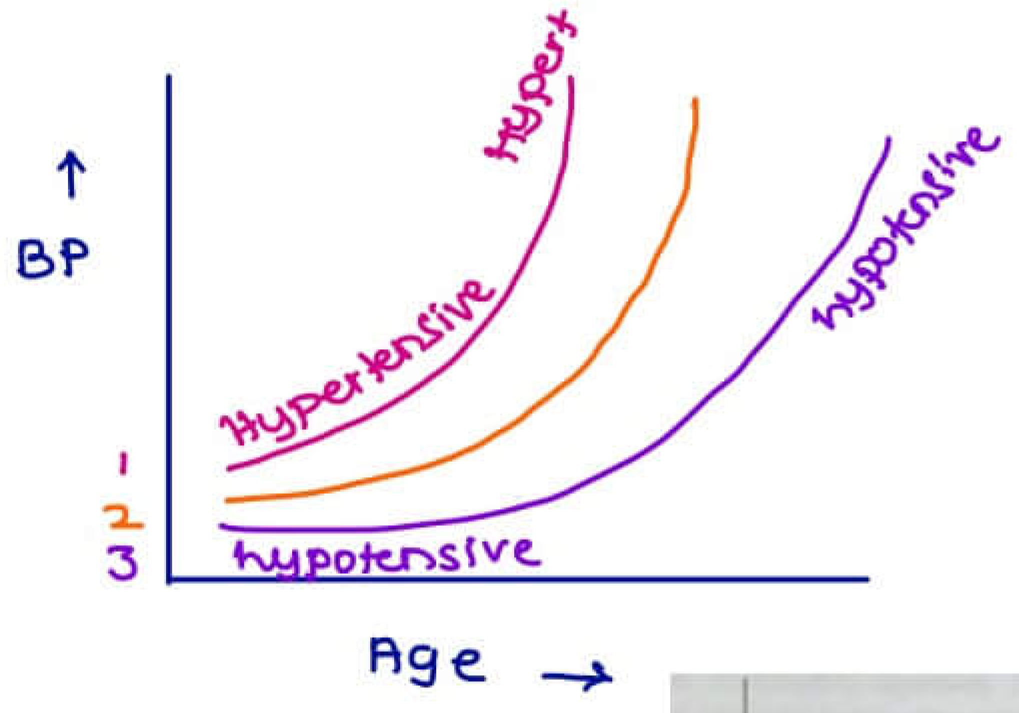
50% Symptomatic

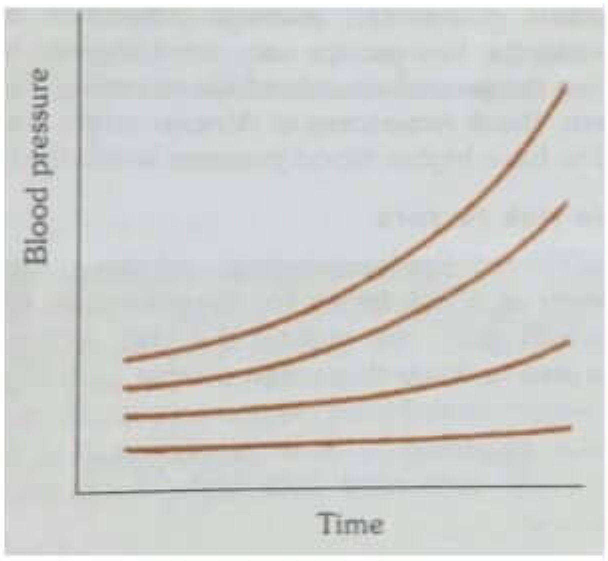
50% Seek Rx

50% get adequate Rx



TRAKING OF BP





New BP classificatⁿ by ACC / AHA' 2017

SBP		DBP		
< 120	&	< 80	→	Normal BP
120 - 129	&	< 80	→	Elevated BP
130 - 139	&	80 - 89	→	Stage 1 HTN
140 - 159	&	90 - 99	→	stage 2 HTN
≥ 160	&	≥ 100	→	Stage 2 HTN

LIFESTYLE MODIFICATIONS TO MANAGE HYPERTENSION

→ Weight Reduction [Reduce by 5-20 mm Hg / 10 kg BW loss]

→ Adopt DASH [Dietary approach to stop HTN] diet plan
   → Reduce by 8 - 14 mm Hg
   → Diet rich in fruits / vegetables, Low fat dairy products
   → reduced saturated fat, Total fat

→ Dietary sodium reduction < 100 mEq / Day [Reduce by 2-8 mm Hg]

→ Physical Activity [Reduce by 4 - 9 mm Hg]
   → Regular aerobic physical activity
   → > 30 min / day, most days of week

→ Moderation of Alcohol consumption [Reduce by 2-4 mm Hg]
   → Limit alcohol consumption < 2 drinks / day

DIABETES MELLITUS

DIAGNOSIS

OGT → Venous plasma glucose level at 2hrs > 200 mg / dL

FBS → > 126 mg / dL

Hb_1AC → > 6.5%

Glycemic Index → Area under 2 hr Glucose response curve

Low GI	< 55	→	Fruits, Vegetables, Grains
Medium GI	56 - 69	→	Sucrose, Basmati Rice
High GI	≥ 70	→	White bread, Corn flakes

Rheumatic fever

Cause → Group A β hemolytic Streptococci [M5 - mc]

Prevalence → 5 - 7 / 1000

Age group → 5 - 15 years of Age

Treatment
   Primary → 1.2 M Units single dose im
   Secondary → 1.2 M Units @ 3 Wkly intervals
      × 5 yrs or 18 yrs of age which ever is later

Revised Jones Criteria →

Initial ARF

2 Major ⓞ
1 Major + 2 minor

Recurrent ARF

2 Major ⓞ
1 major + 2 minor ⓞ
3 minor

MAJOR	MINOR
Carditis Arthritis — Poly A [Low risk P] — mono A or Poly A Poly Arthralgia [med & High risk P] Chorea Erythema marginatum Sub cutaneous nodules	Low Risk Populat^n Poly Arthralgia Fever [≥ 38.5] ESR ≥ 60, CRP ≥ 3 Prolonged PR interval
	Moderate / High Risk P. mono arthralgia Fever [$\geq 38.5°$] ESR ≥ 30, CRP ≥ 3.0 Prolonged PR interval

LATEST CANCER DATA – INDIA [WHO GLOBOCAN 2018]

→ Highest Incidence [Total Population]	→ Breast cancer
→ Highest Incidence [Total male population]	→ Lip / oral cavity cancer
→ Highest Incidence [Total female population]	→ Breast cancer
→ Highest prevalence	→ Breast cancer
→ Highest mortality	→ Breast cancer

OBESITY

I. BMI /

Quetlets index

$\frac{W}{H^2}$ $\frac{Kg}{m^2}$

Global classification

Normal BMI	→	18.5 ↔ 25
Over wt / Pre obese	→	25 ↔ 30
Obesity	→	≥ 30
Underweight	→	< 18.5

Percentile classificat^n

Normal weight	→	5th ↔ 85th
Over wt / Pre Obese	→	85th ↔ 95th
Obesity	→	$\geq$ 95th
Under weight	→	$<$ 5th

Indian classificat^n	→	18.5 ↔ 22.99
Normal weight	→	23 ↔ 25
Over wt / Pre Obese	→	≥ 25
Obesity	→	< 18.5
Under weight		

II PONDERAL INDEX = $\frac{Ht}{\sqrt[3]{wt}}$ $\frac{cm}{\sqrt[3]{kg}}$

III BROCA'S INDEX = $Ht_{cm} - 100$

IV CORPULENCE INDEX = $\frac{\text{Actual wt}}{\text{Desirable wt}}$ cut off − ≤ 1.2

V LORENTZ FORMULA = $Ht_{cm} - 100 - \frac{H_{cm} - 150}{2 [WoM], 4 [Men]}$

VI SFT [skin fold thickness] = Sum ≥ 40 cm in Boys } Obesity ⊕nt
ī Herpenden callipers ≥ 50 cm in Girls

1. Triceps − Single best
2. Biceps • ≥ 18 mm in B } Obesity ⊕
3. Supra iliac ≥ 32 mm in G
4. Subscapular

VII WHR [waist Hip Ratio] = > 1.0 [males] } ↑ Risk of CVD
> 0.85 [females]

VIII WHtR [waist Height R] = < 0.5 → CVD Risk ↑
Independent of Age & Sex

BLINDNESS

WHO Blind → < 3/60 in better eye after Best possible correctⁿ

Ⓠ visual Acuity of Rt eye < 3/60 & lt eye > 3/60. Blind ? → NO
Ⓠ < 3/60 in both eyes. Blind → Yes
Ⓠ < 3/60 in both eyes & after correctⁿ > 3/60. Blind ? → NO

NPCB Blind → < 3/60 in better eye after best possible correctⁿ

WHO categories of visual Impairement

Categories

0				> 6/18	
1	L	Low vision	→	< 6/18 − 6/60	
2	E	Economic Blindness	→	< 6/60 − 3/60	→ work vision
3	S	Social Blindness	→	< 3/60 − 1/60	→ walk vision
4	M	Manifest Blindness	→	< 1/60 − PL ⊕	
5	A	Absolute Blindness	→	Perceptⁿ of Light ⊖	
9				unspecified causes	

MCC Blindness → Cataract (62%) > Refractive Errors (19.7%)
Low vision → cataract (77%)
Ocular morbidity → Refractive error
Prevalence
using < 6/60 → 0.36% [Latest 2019 − 20 value]

RNTCP Revised National TB Control Programme, 1992

HISTORY → NTP 1962

↓ ← DOTS [Directly observed Rx short course] consumption

RNTCP 1992

OBJECTIVES → 90/90

1. >90% cure rate
2. > 90% case detection rate

Components of DOTS →

1. Accountability
2. Good quality sputum microscopy
3. Political commitment
4. Uninterrupted supply of good quality drugs
5. Direct observat^n therapy

DOTS Pura course, Pakka ilaaj

NEW CHANGES 2017 – 18 →

CXR, CBNAAT Test in Diagnosis
Daily Regimens & fixed dose combinations
Active case finding
Drug Resistant TB Rx
Bedaquiline
Informat^n communicable Technology enabled adherence (DOTS-99)
ICT enabled surveillance (NIKSHAY)
Weight Bands 4 for Adults & 6 for children
Merger of RNTCP c̄ NACP
No extens^n for IP
Incentives ↑ed

DIAGNOSIS OF TB →

1 Microscopy
  - Zn staining
  - LED fluorence microscopy
2 Culture
  - LJ medium
  - ALC (Automated liquid culture) systems → BACTEC
  - Drug sensitivity testing
3 Rapid molecular Dx Testing
  - Line Probe Assay
  - CBNAAT [catridge based Nucleic Acid amplificat^n test]
    - basis for gene expert / MTB / Rif
4 Other – CXR
  Tuberculin Skin test

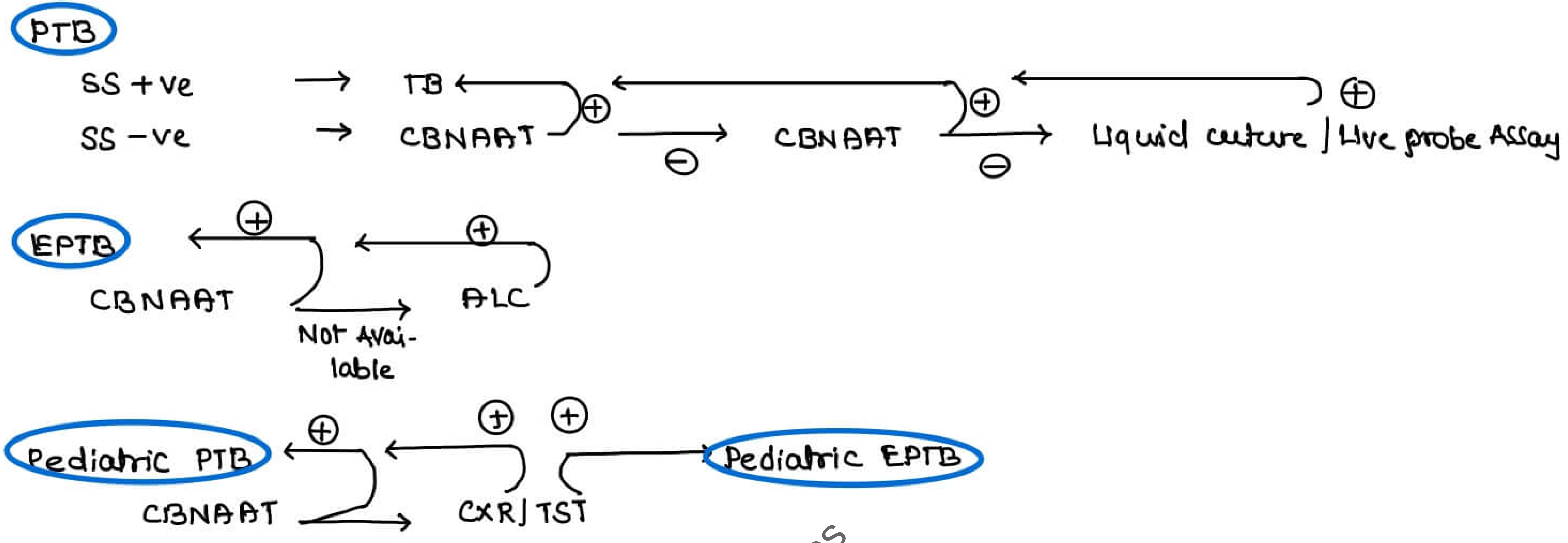
~~IGRA~~
~~Serological~~

Sputum smears

→ 2 SS over a period of 2 days after a cough of > 2 wks
Spot → Day 1
morning → Day 2

→ ZN stain → $0^{+}/2$ } SS −ive
$1^{+}/2$, $2^{+}/2$ } SS +ive

Diagnosis of TB



ACTIVE CASE FINDING

→ Door - Door screening
15 Day campaign
→ Active surveillance by
Health dept worker
ASHAs
TB supervisors

FDS [Fixed Dose combinations]

1. Reduce pill burden
2. Lower relapses
3. Reductn of resistance
4. ↑ ed compliance
5. ↓ side effects

TREATMENT REGIMES – DAILY [No extension of Intensive phase]

CAT 1 SS +ve
SS −ve
CAT 2. Previously Rx
CAT 4 MDR TB [DOTS + earlier]
CAT 5 XDR TB

RNTCP DOTS TREATMENT

CATEGORY 1 [New SS +ve / New SS -ive]
CATEGORY 2 [Retreatment]

Both categories have same treatment regimen [New 2019-20 guideline]
Regimen → 2 [HRZE] + 4 [HRE] = Total 6 month duration

NON-DOTS REGIMENS

ND1 (seriously ill)	2 (SHE) + 10 (HE)	12m
ND2 (non seriously ill)	12 (HE)	12m

Pregnancy c̄ TB

TB → start ATT immediately
→ 2 (HRE) + 7 (HR) 9m
irrespective of time of pregnancy & delivery

MDR TB → DO MTP then start ATT
If no MTP, then start ATT c̄out Kanamycin & Ethionamide substituted c̄ PAS till Delivery

Weight Bands

ADULTS ④	Pediatric ⑥	MDR ⑤
25 - 39 Kg	4 - 7 kg	< 16 kg
40 - 54 Kg	8 - 11 kg	16 - 25
55 - 69 kg	12-15 kg	26 - 45
≥ 70 kg	16-24 kg	46 - 70
	25-29 kg	> 70
	30-39 kg	

NEW DRUGS → DELAMANID
BEDAQUILINE

ICT Based Adherence Support → DOTS - 99
- TB Blister pack has contact Number Hidden

ICT Based surveillance Support → NIKSHAY
- All data entered & connected c̄ central ministry

Incentives

Patients → 500/month
Providers → cat I - 1000/-
cat II - 1000/-
cat IV & V - 5000/-

NPEP [National Polio Eliminatⁿ Programme]

Diagnosis

→ Stool culture & viral isolatⁿ

→ Part of AFP Surveillance [Acute Flaccid Paralysis] → Acute → < 4wks

SMO (Surveillance MO) - min - MBBS

↓

House of Suspected case

↓

collect stool sample

↓

Reverse cold chain [+2 → +8°c]

↓

Lab

→ Age group → 0-15yrs

→ 2 stool samples

24-48 hrs

Each ~ 8gm [Adult thumb size)

< 14 days of onset

Reverse cold chain

>60d follow up visit for residual paralysis

< 90d diagnosis of Polio to be confirmed

AFP surveillance → Indicators

1. Non polio AFP Rate ≥ 2/1,00,000
2. >80% stool samples collectⁿ done

Pulse Polio 1995-96 → Each child 2 drops of OPV to all <5y on same age

Intensified Pulse Polio → House to House survey after PP Day

SWITCH → t OPV (P_1 P_2 P_3) → b OPV (P_1 P_3)

National SWITCH DAY → 25th April 2016

NHM 2013

NRHM [National Rural Health Mission] [2005 - 12] → NHM [2013]

NUHM [National Urban Health Mission] [2005 - 12]

→ NHM 2013 includes RCH , NVBDCP , RNTCP, NLEP, IDSP → comm. Dise. coverage

NPCB, NIDDCP , NPCDS , NMHP , → NCD Coverage

NTCP , NPHCE , NPOH , NPPCF

→ Major Targets

				India
1.	MMR	→	< 1/1000 [100/1,00,000]	130
2.	IMR	→	< 25/1000	34
3.	TFR	→	2.1	2.2

→ components [RMNCH + A strategy]

RBSK, RKSK, NSSK, JSSK, IMNCI, Immunisation, Diarrhoea control, ARI | Pneumonia, family planning

JSSK [Janani shishu suraksha karyakram]

→ NMBS [National Maternal Benefit Scheme] ⟶ JSY [Janani suraksha Yojana]
[12 April 2005]
↓
JSSK
[01 June 2011]

→ Beneficieries

Maternal component	New Born component
free delivery	free drugs
free drugs	free diagnostics
Free Diagnostics	free blood transfusion
free Diet [3D – normal vag. delivery] [7D – cessarian delivery]	NB care corner [NBCC]
	NB stabilizatn unit [NBSU]
free Transport	Specialized NB care unit [SNCU]
free Blood Transfusion	Facility based integrated m_x of childhood illness [f-imnci]
	Nutritional Rehabilatn centre
	Home Based New Born Care

	NBCC	NBSU	SNCU
MCH level	I	II	III
Locatn	PHC	CHC	DH
Care	NB care	Sick + LBW	Sick
Staff	1DOC + 1Nurse	1D + 4N	1 Pead + 2-3D + 10-12N
Beds	0	04	12-20
Training	NSSK	f-imnci	FBNC

NSSK - Navjath sishu suraksha karyakram, FBNC – facility Based NB care

RCH Programme 1997

→ Strategy → RMNCH + A

R	– Reproductive Health	→	RTI | STI
MN	– Maternal & NB Health	→	JSSK
CH	– Child health	→	RBSK
A	– Adolescence	→	RKSK + NSSK

RBSK [RASHTRIYA BAL SWASTHYA KARYAKRAM]

→ Beneficiary → Child [0-18yrs]
0-6yr [Rural + urban slums]
6-18 yr [Government schools]

→ 30 Disorders

4D's
- Diseases
- Deficiencies
- Defects
- Developmental Delays c̄ Disabilites

→ Mobile Health Team → 2 AYUSH MO's, 1 ANM, Pharmacist

RKSK [Rashtriya Kishor Swasthya Karyakram]

→ Beneficiary → Adolescent (10-19 yrs)

→ Components

7C's
- Clinic
- Community
- Communicat^n
- Content
- Convergence
- Coverage
- Counselling

NRC [Nutritional Rehabilitation centre]

→ Beneficiary → SAM < 5 years aged children

→ Stabilization Phase → 1 - 2 Days [Starter diet]
→ Transition Phase → 2 - 3 Days [catch-up diet]
→ Rehabilitation Phase → Vitamin A, Zinc, Copper MV, Iron, Folic Acid

NSSK [Navjat Shishu Suraksha Karyakram]

→ Beneficiary → Early Neonate
→ Training programme for all levels of HC personnel on NB care & Resuscitation

IMNCI [Integrated Management of NN & childhood Illness]

→ components
- Diarrhea
- Measles
- Malaria
- Pneumonia
- PEM

→ Beneficiaries <5yr, <2months, 2m – 5yrs of age

Management

Assess
classify the illness
Identify the Rx
Treatment
Counsel the mother
Give follow up care

HBNC [Home Based New Born care]

→ PN visits By ASHA

6	in institutional Deliveries	on	DAY 3 7 14 21 28 42
7	in Home Deliveries	on	DAY 1 3 7 14 21 28 42

RCH also covers
- Immunizatn
- Diarrhoea
- ARI / Pneumonia
- family planning

NPCBVI , NACB

NPCBVI [National Programme of Control of Blindness & VISUAL IMPAIREMENT]

Blindness → <3/60 in BEBPC
causes → mc – cataract (62%)
RE (19.7%)
Prevalence → 0·36% (2019-20) [<6/60]

→ If Blind school survey used, then estimatn of total Blindness in India
→ Gross under estimatn

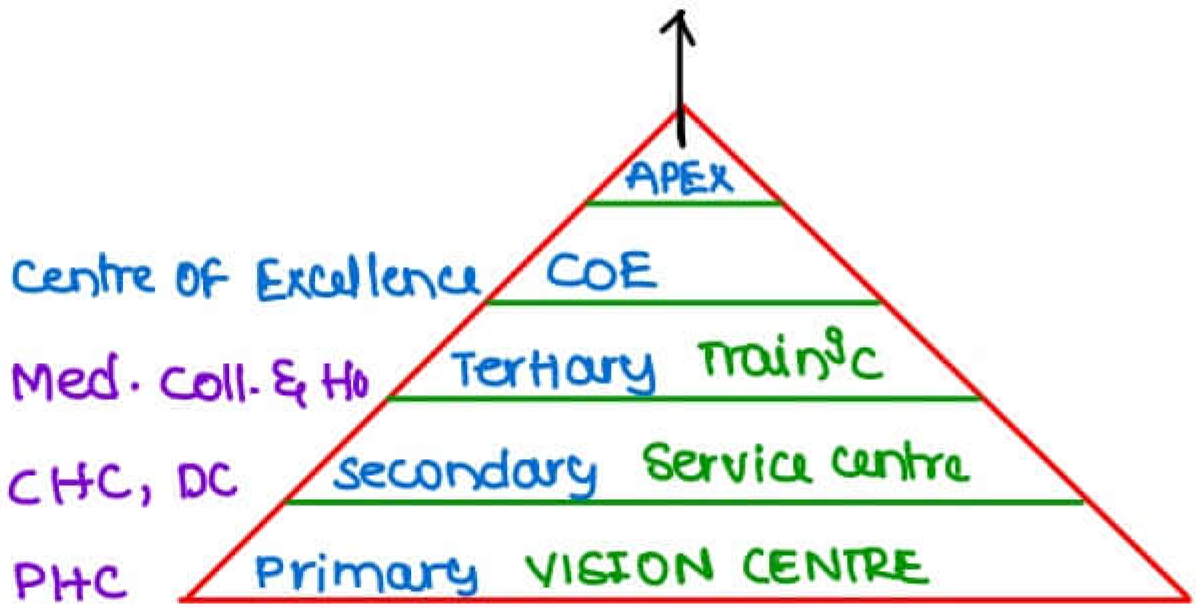
VISION 2020

Main AIM → To eliminate all causes of Avoidable Blindness
1. Preventable
   - Vit A Def
   - Trachoma
2. Curable
   - cataract

Global
1. cataract
2. RE + Low vision
3. Childhood blindness
4. Trachoma
5. Oncocerciasis / River Blindness
   [not present in India]
   No vector

INDIA
1. cataract
2. RE + low vision
3. Childhood blindness
4. Trachoma
5. Diabetic Retinopathy
6. Glaucoma
7. Childhood blindness

Rajendra Prasad Institute of Ophthalmic Sciences, AIIMS, Delhi



NUMBERS	Populatn Norms
2	1/500m
20	1/50 m
200	1/5 million
2000	1/500000
20000	1/50000

Services offered at		By
Vision centre	→ vision testing	→ PMOA [paramedic ophthalmic Assistant]
Service centre	→ cataract Sx	→ Ophthalmologist
Training centre	→ Training	→ Ophthal Department of medical college

School Vision Screening Programme

- → 1 Teacher / 150 students
- → V – VIII (10–14 yrs)
- → Refer to PMOA, PHC [min. pre requisite]
- → VA cut off for referral → <6/9

NACP, 1987 [National Aids Control Programme]

Background → 1st case 1986 chennai
Launched NACP, 1987 [Phase 1, 1992]
NACP 4th phase (2012-17) → To Accelerate, reverse & integrate response

Objectives →
1. Reduce new infectn by 50% (2007)
2. Provide comprehensive care to all PLHA [People living c̄ HIV AIDS] & Rx Services for all who require

Screening → ERS Battery
ELISA
Rapid
Simple

1 out of 3 → before blood Transfusn
2 out of 3 → Symptomatic for HIV
ALL 3 → Asymptomatic for HIV

Diagnosis → Western Blot Assay
Based on P24, gp 41
p24 Ag test
NA Base test
RT PCR test
Quantiplex br. DNA test

Targeted Interventions → CSW, IDU, Truck Drivers, MSMs [men having sex c̄ Men], Migrant labourers, Transgenders, Street children, Adolescents

MTCT / PTCT HIV

→ Rate of MTCT Hiv in India → 30%

→ Rate of MTCT through Breast feed → 12-16%

→ Prevent^n of MTCT

	Efficacy		
1. Zidovidine	> 66%	Best	
2. Nevirapine	> 50%	mc used	→ Single oral Dose
3. Elective CS	> 50%		

Nevirapine Single oral Dose

Mother
20mg
at onset of labour

⊕

New Born
Dose - 2mg/kg oral suscpension
< 72 hr

- Post NVP Prophylaxis MTCT Rate will become → 30% to 15%

4. current modality of choice → TRIPLE ARV PROPHYLAXIS [>90% Efficacy]
   - Tenofovir
     Lamivudin
     Efavirenz $\xrightarrow[\text{earlier in life}]{\text{NNRTI / Efavirenz}}$ Lopinavir / Ritonavir Substitut^n
   - Started from 14 wks POG
     Pregnancy
     Labour delivery + NVP prophylaxis to New Born 0-6 wks age
     Breast feeding
     till 1 wk post BF Stoppage

→ Testing of HIV [ICTC centre]
1. OPT - IN → Testing offered to patient to give consent
2. OPT - Out → Patient informed that testing is routinely done & consent assumed unless patient declines [India]

→ ART Initiat^n → irrespective of CD4 Count

NVBDCP, NLEP

NVBDCP [National vector Borne Disease Control Programme, 2003-04]

→ MC VBD → Malaria
MC Viral VBD → Dengue
MC arboviral VBD → Dengue

→
1 Malaria
2 Filariasis
3 Dengue
4 Kala Azar
5 JE
6 CGF

Anopheles
∠45°
राष्ट्रीय वैक्टर जनित रोग नियंत्रण कार्यक्रम
NVBDCP

Malaria

Diagnosis
- → PBS [JSB, Jaswant singh Battacharya stain]
- → Dip stick test [Rapid Diagnostic kit test] based on Pf histidine Rich protein Type 2
- → 1 microscopy / 25000 POP
- → Optimal Test

ITBN
- → Insecticide R Bed Nets
- → shelf life – 6 months
- → 2.5% Deltamethrin [25 mg/m²]
  5% cyfluthrin [50 mg/m²]

LLIN
- → long lasting Insecticide R Bed nets
- → shelf life – 3 yrs
- → use chemical binder

Treatment [2013]

CASES

$$\underbrace{P_{vivax} \qquad P_{ovale}}_{\text{Chloroquine + Primaquine}} \qquad\qquad \underbrace{P_{fal.} \qquad P_{malariae}}_{\text{ACT + Primaquine}}$$

Other parts of India	North East India
ACT – SP + PQ	ACT – LM + PQ
A = Artesunate	A = Artemether
S = Sulfodoxime	LM = Lumefantrine
P = Pyrimethamine	

→ Pregnant cases
1. PQ withdrawn
2. 1st Trimester
   Quinine > ACT

Chemoprophylaxis
- Short term [≤ 6 wks] → Doxycycline [1 days before 4 wks after return]
- Long term [> 6 wks] → Mefloquine [2 wks before & 4 wks after return]

Malariometric measures

OLD
- → Spleen Rate → Endemicity
- → Infant parasite rate → Recent transmission

NEW
- → Annual Parasitic incidence [API] → Best indicator of malaria control
- → Annual Blood Examinatn Rates → Best indicator of operational efficiency
- → Slide positivity Rate
- → Slide falciparum Rate

KALA AZAR

Treatment

1. LAMB → 10 mg/kg B. wt — Liposomal Amphotericin B
2. MILTEFOSIN + PARAMOMYCIN
3. Amphotericin B emulsion
4. Miltefosin capsule
5. Amphotericin B Deoxy cholate
6. Amphotericin B emulsion injectⁿ

NLEP [National leprosy Eliminatⁿ Programme]

MULTIDRUG THERAPY

	PBL [Pauci Bacillary]	MBL [Multi Bacillary]
No. of skin lesions	→ ≤5	→ >5
Nerve involvement	→ 0-1	→ ≥1N mc – Ulnar nerve Test at medial condyle Check for cord Thickness
RJC	→ TT BT	→ BB BL LL
No of Drugs	→ 2 Dapsone Rifampicin	→ 3 Dapsone Rifampicin Clofazemine [C_2]
Duration of Rx	→ 6 m	→ 12m
Duration of follow up	→ 2yrs	→ 5yrs

→ MDT completed, no change in lesions → Stop MDT
Reassure
[Bacteriological recovery do not coincide c̄ clinical Recovery]

→ OAMS [Once A Month Supervised Therapy]
→ Accompanied MDT
  – Any responsible person can collect MDT therapy on behalf of patient
→ Uniform MDD
  – Dapsone + Rifampicin + Clofazamine to all
→ SET centre → Survey Educatⁿ & Rx centre
→ SIS → Simplified Informatⁿ System

National Iodine Deficiency Disorder control Programme [NIDDCP], 1992

National Goiter control Programme, 1962 ⟶ NIDDCP, 1992

Impact Indicators → Major → UIE [Urinary Iodine Excretⁿ] levels
- generally measured in pregnant ♀
- over 24hrs

Others → Neonatal hypothyroidism
Goitre

Level of Salt Iodinisatⁿ → 30 ppm at production level
15 ppm at consumer level

Two-in-one salt → 40 μg Iodine + 1 mg Iron / gm of Salt

Criteria to track eliminatⁿ →
1 Enlarged thyroid (6-12y) → < 5%
2 UIE < 100 μg/L → < 50%
3 UIE < 50 μg/L → < 20%
4 Households c̄ iodised salt → > 90%

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

→ Encompasses

Regular surveillance	Sentinel surveillance	Periodic surveillance
VBD (malaria)	HIV	NCD Risk factors c̄
WBD (Typhoid, cholera)	HPV	Anthropometry
RD (TB)	HCV	BP
VPD (Measles)	Water quality	Tobacco c̄ Nutritional Status
Polio	Air quality	Blindness
RTAs		
YF, Plague		
Meningitis		
Haem. Fever		
Resp. Distress		

→ Forms under IDSP

S form	→ Suspected cases	→ by Health workers	→ Syndromic Dx
P form	→ Presumptive cases	→ Doctor / med. officer	→ Presumptive Dx
L form	→ Lab confirmed cases	→ Lab Staff	→ Confirmed Dx

NEW PROGRAMS

1. AYUSHMAN BHARAT SCHEME [ABS]

A. HEALTH & WELLNESS CENTRES [HWC]

- → 1.5 Lac HWC centres
- → comprehensive health care [including MCH, NCDs]
- → Free essential drugs & diagnostic services

B. NATIONAL HEALTH PROTECTION SCHEME [AB-NHPS] / PRADHAN MANTRI JAN AAROGYA YOJANA [PMJAY]

- → Target → 10.74 crore families, Total 50 crore people]
- → Apex level → chaired by Union Health & family Welfare Minister
- → Defined Benefit cover
  - → Rs 5 Lakh / family / year ; No cap on family size & age
  - → Secondary & Tertiary care hospitalization
  - → cashless & paperless Scheme
  - → Public hospitals & empanelled private hospitals
  - → include 1,354 packages [including Bypass, stenting, knee replacements]
- → Hospital Eligibility
  - → All public hospitals
  - → Empaneled private health care facilities
  - → Empanelment criteria → Hospitals c̄ > 10 beds

2. ANEMIA MUKT BHARAT [AMB] / INTENSIFIED IRON PLUS INITIATIVE

→ **MAIN AIM** → to reduce prevalence of anemia by 3% points per year among children, adolescents and women in the reproductive age group [15 - 49 yrs], b/w the year 2018 - 22

→ **ANEMIA MUKT BHARAT 6×6×6 Strategy**
  - → 6 Beneficiaries
  - → 6 Mechanisms
  - → 6 Interventions

→ **PROPHYLACTIC DOSE & REGIME FOR IRON FOLIC ACID SUPPLEMENTATION**

AGE GROUP	ELEMENTAL IRON [mg]	FOLIC ACID [µg]	Frequency	Remark
6-59 months children	20	100	Biweekly	Bottle [50ml]
5-9 years children	45	400	Weekly	Pink color tablet
10-19 years Adolescents	60	500	weekly	Blue color tablet
20 - 49 years women [NPNL]	60	500	Weekly	Red color tablet
Pregnant, Lactating mothers	60	500	Daily	Red color tablet

3. SWACHH BHARAT MISSION [SBM] 2014 / SWACHH BHARAT ABHIYAN

→ **AIM** : To eradicate/end Open - defecation in India by 2019 by construction of 12 million toilets

→ **SWACHH BHARAT MISSION - GRAMIN [SBM - G]**
  - → construction of toilets in Government schools [Ministry of Human Resource & Development]
  - → Rural school sanitation → Separate Boys / Girls toilets [Dept. of School Education]
  - → construction of toilets in Anganwadi centers [Ministry of women & child development]

→ **SWACHH BHARAT MISSION - URBAN [SBM - U]**
  - → Household toilets [and conversion of insanitary latrines to pour-flush latrines, community toilets, public toilets, solid waste management, IEC & public awareness, capacity building
  - → implementation by → Ministry of urban development

4. NATIONAL NUTRITION MISSION [NNM] 2017-18 | POSHAN ABHIYAN

→ **NNM VISION** → To ensure attainment of malnutrition - free india by 2022

→ **NNM TARGETS**
  - → to reduce stunting, under nutrition, anemia [among young children, women & adolescent girls] & reduce Low birth weight by 2%, 2%, 3% and 2% per anum respectively
  - → achieve reduction in stunting from 38.4% [NFHS - 4] to 25% by 2022 [mission 25 by 2022]

Integrated Child Development Services (ICDS) 1975 [Rural areas & urban slums]

Heart of ICDS → Anganwadi

Population norms → 1 AW / 400-800 in plains
1 AW / 300-800 in hills

Beneficiaries →
1. children [0-6yrs]
2. pregnant & lactating ♀
3. Non pregnant non lactating Reproductive age 15-49 y ♀
4. Adolescent Girls (11-18yrs)

Services →
~~OPD/IPD~~
Health Educatⁿ
Immunizatⁿ
Family planning & contraceptive
Referral services
Non formal pre school educatⁿ
Health check ups
free food supplementations

FREE FOOD SUPPLEMENTATⁿ →	calories (1/3)	Proteins (1/2)	
	500 K.cal	12-15 gms	6-72 m children
	800 K.cal	20-25 gms	Malnourished children
	600 K.cal	18-20 gms	Preg & lactating mothers

Administratⁿ
ministry → Ministry of Women & child development
unit → Community development Block
1 ICD Block = 100 villages = 1 lakh pop → CDPO

HEALTH SCHEMS

Mid Day Meal Programme / Mid Day Meal Scheme

	⅓ calories	Proteins ½	cereals
Primary →	450 K.cal	12 gm	100 g
Upper Primary →	700 K.cal	20 gm	150 g

Ministry → Human Resource & Development

National Programme for Preventⁿ & control of Diabetes, CV diseases & Stroke (NPCDCS)

→ launched in 100 districts & 21 states

Sub centre → Health promotⁿ
Opportunistic Screening for BP & Sugar
Referral to CHC for DM, HTN

CHC → Diagnosis & Management at NCD clinics
Home visits for bed ridden patients
Referral to DH if complicated cases

DH → Health promotion
Screening for > 30yrs
Dx & Mx of CV diseases
Palliative care for chronic debilitating progressive patients

Urban Health → Screening of urban slum populatn
check up scheme Screening for populatn >30yr pregnant ♀
cancer control → RCC, OWDS

Health Policies & Legislations

PMSSY 2006 [Pradan mantri Swasta suraksha yojana]

→ correctn in imbalances in availability of affordable Health care in country

→ components

1. Opening up of AIIMS like institutn across country
2. Upgradatn of Medical colleges & institutn in India

Pradhan Mantri Jan Dhan Yojana [PJDY]

→ National mission for financial inclusion

→ launched on 15th August 2014

MTP ACT 1971

Indications → Humanitarian
Eugenic
Therapeutic
Social

Education Qualificatn → MD Gynobs
Diploma Gynobs
MBBS + 6m JRship in Department of Gynobs

Experience → ≥ 25 MTP's
Timing → 0 – 20 wks → 0 – 12 wks [low risk] — 1 Doctor Opinion
→ 12 – 20 wks [High risk] — 2 Doctor opinion

Organ Transplantatn Act, 1994

→ Any person ≥ 18yrs can authourise

→ Only for therapeutic purpose

→ 2011 onwards 10 yrs imprisonment + 20 lakh – 1crore fine

National Rural Employment Guarantee Act 2005

→ > 100 days of employment / year

→ Job card Given

→ < 15 days → employment

→ < 5km Radius of house

→ unskilled mannual labour work

→ standard wages

→ BPL Families

100
NREGA
राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम

BIO MEDICAL WASTE MANAGEMENT

INTRODUCTION

→ BIOMEDICAL WASTE MANAGEMENT in India covered by EPA [Environment Protectn Act 1986]
- Sectn 6, 8, 25

→ 4 SCHEDULES

SCHEDULE I → categorization, Segregation, Processing, Treatment, Disposal
SCHEDULE II → Standards for treatment & Disposal
SCHEDULE III → Authorities & Duties
SCHEDULE IV → Labels For BMW bags, containers

→ Under Ministry Of Environment & forests

LATEST GUIDELINES 2017-2018

→ earlier → BMW Rx 1998
- 10 categories, 4 colorcoded bags & disposal

→ 2017-18 → - Discarded (10 categories) ; 4 categories (4 colorcoded bags) & disposal

→ YELLOW CATEGORY

INCINERATION/ PLASMA PYROLYSIS (1200°C)/ DEEP BURIAL:
- ① - Human anatomical waste → Placenta, Appendix, Gall bladder, Amputations
- ② - Animal waste → Animal House
- ⑥ - Soiled waste [cotton/cloth] → Gauge pieces, Bandages, Dressings, Swabs

INCINERATION / PLASMA PYROLYSIS/ ENCAPSULATION:
- ⑩ - chemical waste → Disinfectants, productn of Biologicals
- ⑤ - Discarded medicines → Expired medicines, cytotoxic Drugs

⑧ - Liquid chemical waste [Cleaning, House keeping, disinfectn activities] → Chemical Rx $\xrightarrow{F/b}$ Drain

Non chlorinated chemical Rx $\xrightarrow{F/b}$ incineratn:
- ③ - Microbiological, Biotechnological, lab waste [cultures, live vaccines, toxins, other Biological]
- → Bed Linen, mattresses, Bedding

→ **RED CATEGORY**

⑦ – Solid / contaminated [Recyclable] waste
[plastic / Rubber] Tubings
catheters
canules

→ AUTOCLAVING / MICROWAVING / HYDROCLAVING
↓
DESTRUCT^n / SHREDDING
↓
ENERGY RECOVERY / FUEL OIL / ROAD MAKING

→ WHITE CATEGORY

4 → Wasted Sharps
Needle, S_x blades, Scalpels

→ AUTOCLAVING / DRY HEAT
↓ F/b
SHREDDING / MUTILAT^n / ENCAPSULAT^n
↓ F/b
FOUNDRIES / LAND FILS / SHARPS PITS

→ **BLUE CATEGORY**

– Glass ware
Metallic Body implants
→ Orthopedics
→ ENT
→ Dental
→ Cardio thoracic vascular S_x

} CHEMICAL R_x / AUTOCLAVING / HYDROCLAVING / MICROWAVING $\xrightarrow{F/b}$ RE-cy-cling

METHODS

Incineration

→ temperature → >1200°C
→ principle → High temperature + Dry Oxidat^n
→ combustible matter > 60%
Non- combustible solids < 05%
Non- combustible fines < 20%
Moisture content < 30%

→ contraindicated are

1. PVC Plastic Waste ⟶ Angiosarcoma of Liver
2. Pressurised waste ⟶ Explos^n can occur
3. Heavy metal waste ⟶ Lead, cadmium, mercury → poisoning
4. Reactive chemical waste ⟶ Silver [X Rays]
5. Radio active waste ⟶ Sea burial is recommended

AUTOCLAVING

→ Temperature in india → 121°C 60 min 15 psi
135°C
145°C

→ Principle → steam under high pressure
→ Check sufficiency of autoclaving → GBS [Geo Bacillus Stearothermophilus]

HYDRO CLAVING

→ Temperature → 121°C or 132°C
→ principle → steam under pressure
→ check sufficiency → Bacillus subtilis

MICRO WAVING

→ 12 nm, 2450 MHz
→ principle → Generatⁿ of CONVECTION CURRENT in heated water molecules
→ Check sufficiency → Bacillus atrophaeus

ENCAPSULATION

→ Filling containers c̄ BMW & immobilizatⁿ materials [foam, sand, cement, clay]
↓
Seal the containers

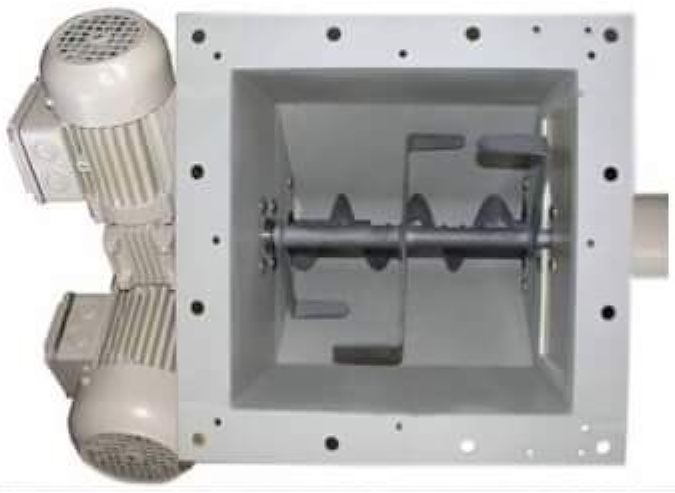
PLASMA PYROLYSIS → > 1200°C

INERTIZATION

→ large volumes of toxic BMW
↓
NON TOXIC WASTE [Inert]

→ 15% Cement + 15% Lime

SCREWFEED TECHNOLOGY



Rotating Auger

→ BMW mixed c̄ cement
↓
Rotating Auger [Heating & shredding]

→ Non Burn, dry thermal process
→ ↓ weight by 20 - 25%
↓ volume by 80%
→ used for sharps waste, infectious waste
→ CI for Radiological, cytological, pathological waste

DRY Heat → > 185°C

COMPOSTING → Land + cow dung [GOBAR]

Vermi – composting

→ Earth worms [Eisinea foetida] + Land + mature COWDUNG [KHAD] + Coconut Husk

SPECIFIC WASTE DISPOSAL

HIV Infected Material Disposal

→ ℞ c̄ 1% hypochlorite

↓

categorize

↓

Disposal

Mercury Disposal

→ Recollect → Recycle → Reuse $[R^3]$

e – waste Disposal → Recycle

Blood spill → 1% hypochlorite [neutralizer] → Drain

TB SPUTUM → Incineration, Burning, Autoclaving, Boiling, 5% cresol

DISASTER MANAGEMENT

Definitions

Disaster → An occurance that causes damage or ecological disrupt^n or the loss of human life or deteriorat^n OF health or health services ON A SCALE sufficient to warrant an extra ordinary response from outside of that community or area.

→ COLIN GRANT

Any occurence or catastrophy causing injury and/or illness simultaneously to ≥ 30 persons who require hospital emergency services

Disaster Mitigat^n

→ Prevent^n OF convers^n of hazard / risk into disaster situat^n [to minimize the damage]

Surge capacity

→ ability of a health system to respond to disaster situations

TYPES OF DISASTERS

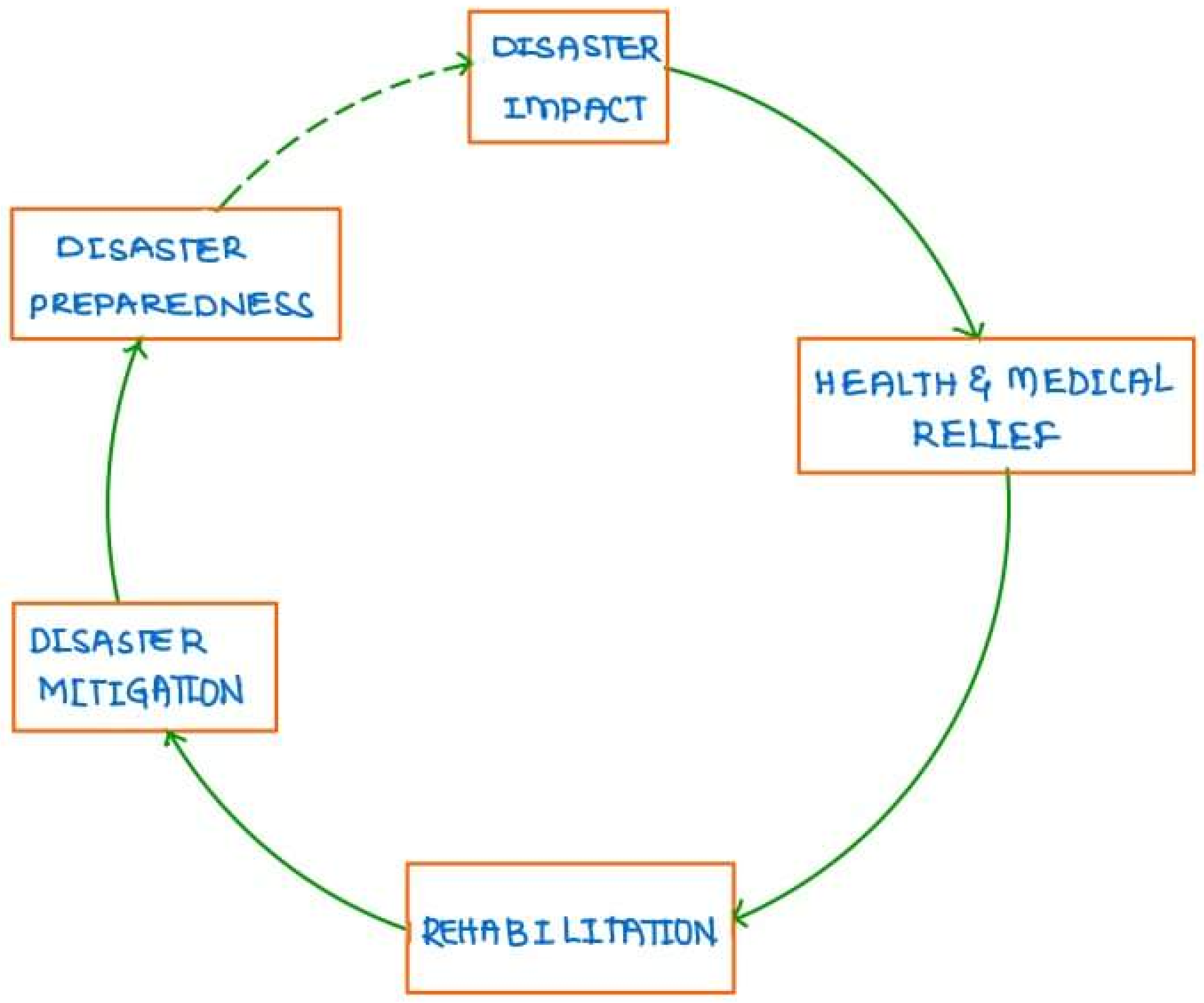
NATURAL

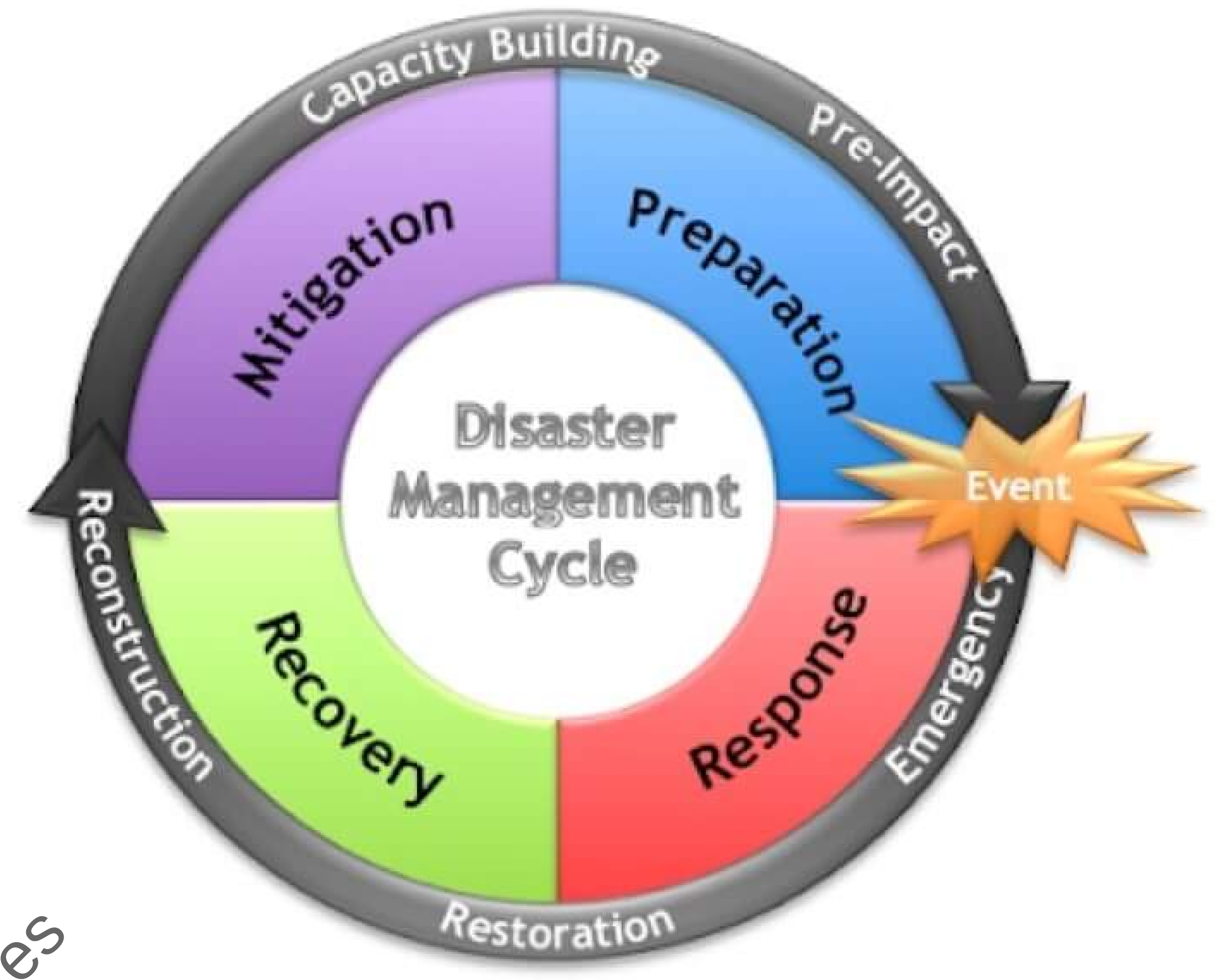
Geological – Earthquakes, volcanos
Hydrological – Floods, Tsunamis
climatological – Droughts, fires
Biological – Epidemics
Extraterrestrial – meteorites

MANUAL

Wars
Accidents

DISASTER CYCLE





Health & Medical Relief

1. Primary phase [0-6 hrs] → First aid, medical care
2. Secondary follow up [6-24 hrs] → Transportatⁿ, Sanitatⁿ, Immunizatⁿ
3. Tertiary clean up [1-60 days] → food, clothing, Shelter, Employment, Social services, Rehabilitatⁿ

TRIAGE

- → classificatⁿ of victims of disasters
- → On basis of likelihood of survival
- → done at the site of disaster
- → categories

Priority		
Highest	→ Immediate Resuscitatⁿ or Limb/ Life saving Sx 0-6hrs	RED
High	→ possible Resuscitatⁿ or limb/ life saving Sx 6-24 hrs	YELLOW/BLUE
Low	→ Minor injuries [non life threatening], Ambulatory	GREEN
Least	→ Dead & moribund [about to die]	BLACK

- → colour coding → TAGGING
- → Types of Triage

START → Simple triage And Rapid Treatment
→ In remote inaccessible areas of country, done by LAY PERSONS

REVERSE TRIAGE → minor injuries must be given highest priority
→ In wars, Battles

PDP [Post Disaster Phase]

→ MC disease reported is Acute Gastro-enteritis

→ Not seen in PDP ?

Typhoid	Scabies	Leishmaniasis	URI
Cholera	TB	Leptospirosis	

→ MC vitamin deficiency → Vitamin A [B_3, C]

→ vaccines in PDP → All C/I except Measles

Q which WHO vaccines are C/I in PDP
→ esply Typhoid, Cholera, Tetanus toxoid [all others are relatively C/I]

Q which vaccine is mandatory for medical persons
→ Typhoid, Cholera, Tetanus toxoid

→ most important preliminary step in PDP → Chlorinat^n
- residual Cl_2 in drinking water → ≥ 0.7 mg/L [ppm]

DM in INDIA

→ National Disaster Management Authority [NDMA]
- chair person → Prime ministry

→ Nodal ministry → Home Affairs

→ Nodal centre → District

→ National Institute of Disaster management [NIDM]
- under Home Affairs
- under Union Home minister

National Disaster Response force
- includes CRPF, BSF, ITBP, CISF

→ maximum mortality is reported from Hydrological Disasters

Worst man made disaster → Bhopal Gas Tragedy, 3rd Dec 1984
- methyl isocyanide exposure

→ world disaster RISK reduct^n Day → 13 th October

OCCUPATIONAL HEALTH

OCCUPATIONAL DISEASES

I. Physical Agents

Heat → Hyperpyrexia, Exhaustion, Stroke
Cold → Chill Blains, Frost Bite
Light → Cataract, Miner's nystagmus
Pressure → Caisson's Disease
Noise → Deafness
Radiat^{n} → Leukemias, Aplastic anemias
Others → Burns, injuries, Accidents

II Chemical Agents

Gases → Poisonings
Dusts → Pneumoconioses
Metals → Heavy metal poisonings
Chemicals → Poisonings [solvents]

III Biological Agents

Brucellosis
Anthrax
leptospirosis

IV Occupational Dermatitis → mainly in metal type of exposure

V. Occupational cancers

VI Others → Neurosis, Hypertension

PNEUMOCONIOSES

→ d/t occupational exposure to dust
→ < 0.5 μ → always in Brownian motion [moves in & out]
0.5 – 3 μ → most dangerous partical size
3 – 5 μ → Trapped by mid respiratory tract
5 – 10 μ → Trapped by upper resp. tract
> 10 μ → fall on machine

→ common Pneumoconioses

	d/t	MC Disease Associat^{n}	MC occupational associat^{n}
Silicosis	Silica Dust	TB	Cement, Glass, Bauxite miners Industry
Anthracosis	Coal Dust	Progressive Massive fibrosis	Coal miners Industry
Asbestosis	Asbestos Dust	Mesothelioma, Lung cancer	
Byssinosis	Cotton fiber dust		Textile Industry
Bagassosis	BAGASSE		Sugar Mill

	d/t	mc associated organism
Farmer's lung	mouldy Hay	micropolyspora faeni
compost lung	compost	Aspergillus
Bird fancier lung	Bird droppings	
Siderosis	Iron	
Stannosis	Tin	

→ mc micro organism associated c̄ Bagassosis → Thermoactinomyces sacchri
→ mc, mc cause of Death, Mc cause of Disability → SILICOSIS

→ Notifiable Diseases under factory Act' 1948
1. Silicosis
2. Anthracosis
3. Asbestosis
4. Byssinosis

→ snow storm appearance on CXR → Silicosis
→ Byssinosis → mc seen in SPINNERS
→ for Bagasossis control in sugar mill → 2% Proprionic Acid spray is used

LEAD POISONING / PLUMBISM / PAINTER'S COLIC

→ mc source in India → Petrol/ Gasoline / vehicular exhaust
mc mode in India → Inhalatn

→ c/f
- Bartonian Line → Blue line on gums [lead sulphide PbS]
  Pallor → 1st sign, most consistent sign
  Wrist / foot Drop → Nerve palsy
  } d/t inorganic lead exposure
  colic
  Encephalopathy
  → d/t organic lead exposure

→ Screening Test → CPU [Copro Porphyrin in Urine]
→ Cutt off > 150 mcg/L

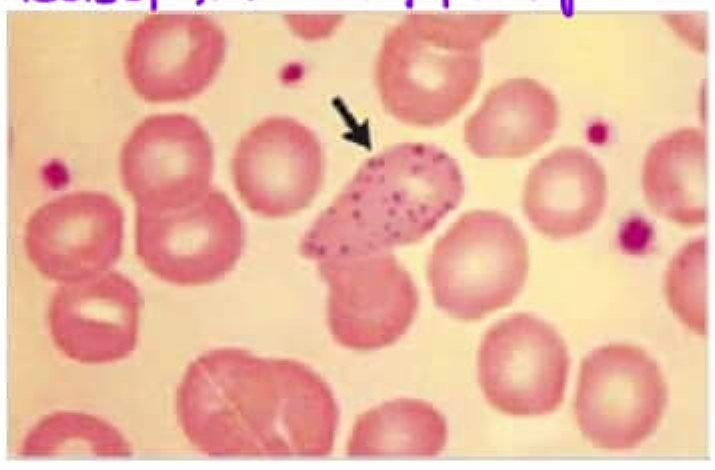
cut offs

→ Diagnostic Test → ALAU [Amino levulinic Acid in Urine] → > 5 mg/L
Lead levels in Blood → > 70 mcg/100m
Lead levels in Urine → > 0.8 mg/L

→ mainly RBC's Affected

$$\text{RBC'S} \longrightarrow \begin{cases} \to \text{Basophilic stippling} \\ \to \text{Microcytic hypochromasia} \end{cases}$$

Basophilic Stippling



→ R/OC → 1. EDTA
2. Penicillamine

→ Prognostic Test → PBS [Peripheral Blood Smear]

OCCUPATIONAL CANCERS

→ mc occupational cancer → Skin [Squamous cell carcinoma]

→ PVC [Poly vinyl chloride] Exposure → Angiosarcoma Liver
Asbestos → Mesothelioma
Benzene → Leukemia
Benzidine, N_2 / Aniline } Bladder cancer [Transitional cell carcinoma]
Nickel, chromium, wood dust → Nasal sinus carcinoma
RADON, Silica } Lung carcinoma

CAISSON'S DISEASE / DECOMPRESSION SICKNESS

→ Affects deep sea drivers
→ d/t Low pressure

N_2 Effervescence ↓
- Bends
- Chokes
- Prickles
- Paralysis [most severe]
- Aseptic Bone Necrosis

Air Expansion ↓
- Baro otitis
- Baro sinusitis
- Baro odontalgia
- Emphysema [most severe]
- Abdominal distention

→ R/OC → 1. Recompression chambers
2. Hyperbaric O_2 therapy

ERGONOMICS

→ Science where we study people's efficiency in their working environment.

→ Pre Placement Examination
- Right man in Right Job
  Fitting Job to work

Post Placement Examinatⁿ
- Regular periodic Examinatⁿ
  Annual → most occupatⁿ. Exposures
  Every 2m → Radiatⁿ exposure
  monthly → Lead, Dye, Radium "
  Daily → Dichromates

SICKNESS ABSENTISM

1. Medical causes
2. Non sickness causes →
   - → Economic
   - → Social
   - → Others

→ 8-10 days / person / year

OCCUPATIONAL HEALTH LEGISLATIONS

THE FACTORY ACT 1948

→ Factory → ≥ 10 persons working together c̄ power or
≥ 20 persons working together c̄ out power

→ Not applicable on
- → Defence
- → Mines
- → Railways
- → Eateries / food Joints

→ Child → 0-14 yrs [Employment prohibited <14 yrs]
→ Adolescent → 15-18 yrs
→ Work Hour Duration → 9 hrs / Day
48 hrs / week
60 hrs / week [overtime]

→ 1 safety officer / 1000 workers
1 welfare officer / 500 workers
1 canteen / 250 workers
1 creche / 30 female workers

→ 29 Notifiable Diseases
→ Per capita space > 500 cu. ft.

The ESI Act 1948

→ ESI → Employees state Insurance
→ ministry → union ministry of labour
chair person → union minister of labour

→ Contribution → Employer → 3.25% of wages
Employee → 0.75% of wages

→ centre : State → 7:1

→ **Coverage**

- All Non Seasonal factories where ≥ 10 persons
  All Other factories where ≥ 20 persons

- Income < 21,000/- per month

→ **Not applicable on** → Defence
→ Mines
→ Railways

→ **Benefits**

1. Medical Benefit → Full medical care
2. Sickness Benefit → 70% wages × 91 days
   Extended sickness benefit → 80% wages × 2 years
   Enhanced sickness benefit → 100% wages × 7 Days [vasectomy]
   × 14 Days [Tubectomy]
3. Temporary Disablement Benefit → 90% wages till recovery
   Permanent Disablement Benefit → 90% wages [worked by Medical Board]
4. Maternity Benefit → 100% wages × 26 weeks
5. Dependence Benefit → 90% wages as pension
6. Funeral Expenses → Upto Rs 15,000

GENETICS & HEALTH

GENE → A sequence of DNA/RNA which codes for a molecule c̄ a particular funcⁿ

GENOME → Sum total of genetic informatⁿ of an individual, encoded in the structure of DNA

GENOMICS → The study of human gene

GENE THERAPY → Introductⁿ of a gene sequence into a cell so as to modify its behavior

DNA TECH → Development of new Dx technique based on DNA Eg. Restrictⁿ enzymes

EUTHENICS

Environmental manipulatⁿ for full expression of genes

Eg. Diabled friendly scholls

EUGENICS

Genetic manipulatⁿ for full expression of genes

Positive

- IVF
- Gene cloning
- Egg transplant

Negative

- Abortⁿ
- Sterilizatⁿ
- Family planning

GENETIC COUNSELLING

PROSPECTIVE

→ Done to identify heterozygotes through screening & then advise them

→ Eg

Thalassemia

Sickle cell anemia

RETROSPECTIVE

→ Seeking advice when a herditory disorder has already occured in the family

→ Eg.

congenital anamoly

Mental Retardatⁿ

Metabolism Errors

HUMAN GENOME PROJECT

→ By Dr JAMES D WATSON (1990)

→ Total no. of genes in human genome → 19000 – 20000 [~ 19,500]

HARDY WEINBERG LAW OF GENETICS

→ Law of populatⁿ Genetics

→ $(a+b)^2 = a^2 + b^2 + 2ac$

→ Frequency of genes remain constant from one generatⁿ to another generatⁿ

→ **Applicable on**

large populatⁿ

Static populatⁿ

Random mating populatⁿ

Not Applicable on

Small populatⁿs

Dynamic populations

Non Random mating populatⁿ

Assortative mating populatⁿ

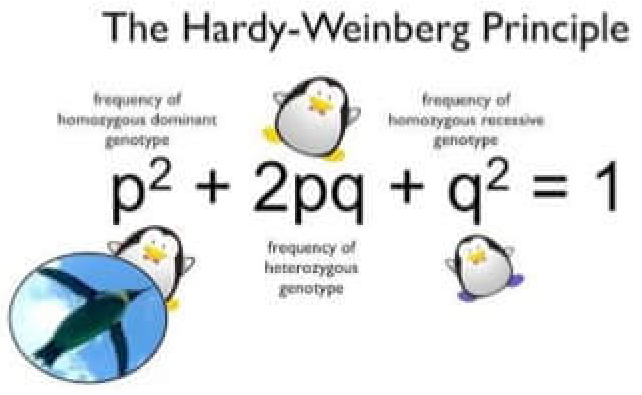
Mutation

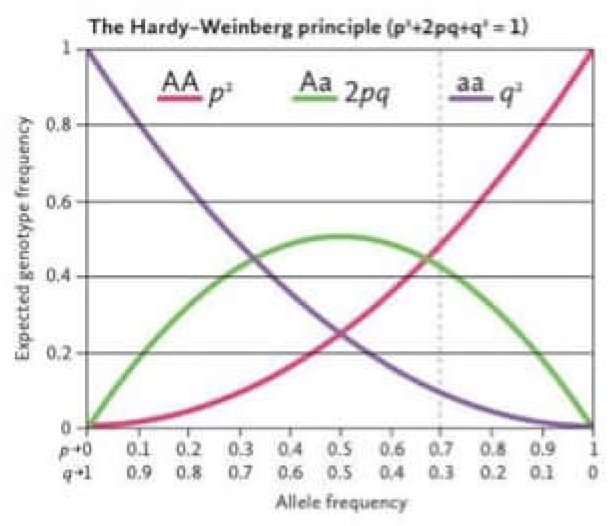
Gene Flow

Gene Drift

Natural selection

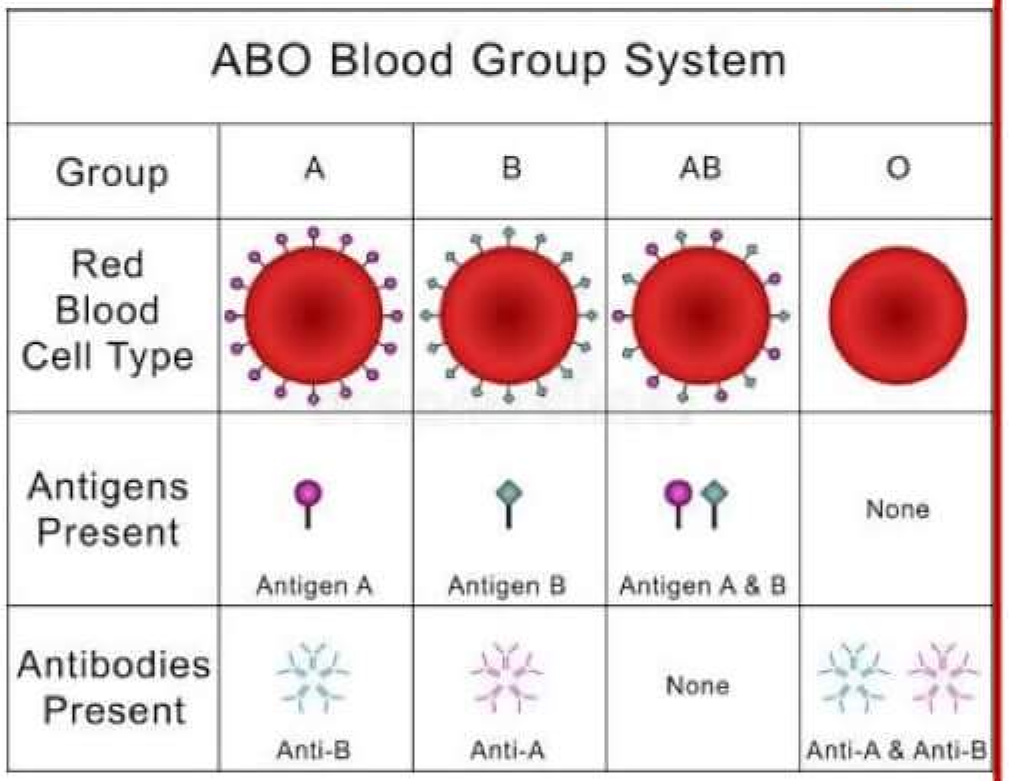
Migratⁿ


The Hardy-Weinberg Principle
frequency of homozygous dominant genotype
frequency of homozygous recessive genotype
p² + 2pq + q² = 1
frequency of heterozygous genotype



BLOOD GROUPS IN INDIA

ABO		RH	
O	40%	Rh^+	94%
B	33%	Rh^-	06%
A	22%		
AB	05%		



ABO Blood Group System

Group	A	B	AB	O
Red Blood Cell Type				
Antigens Present	Antigen A	Antigen B	Antigen A & B	None
Antibodies Present	Anti-B	Anti-A	None	Anti-A & Anti-B

BOMBAY BLOOD GROUP

→ cannot express ABO d/t absence of H antigen

→ cannot recieve blood except Bombay blood group

→ 4 persons | million populat^n

→ aka HH Blood group

AMNIOCENTECIS INDICATIONS

1. Age of women >35 yrs
2. H/o Down's syndrome
   chromosomal defects
   metabolic defects
3. Sex determinat^n is warranted

MENTAL HEALTH

Intelligence Quotient (IQ)

→ Score derived from standardised tests

→ STERN'S IQ Test

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$$

= IQ Points

→ useful till 15yrs

Ⓠ 15 yrs old child has mental age 5 yrs, IQ → ?

$$IQ = \frac{5}{15} \times 100 \longrightarrow 33 \rightarrow \text{Imbecile}$$

IQ classification

Idiot	→	0-24
Imbecile	→	25-49
Moron	→	50-69
Borderline	→	70-79
Low normal	→	80-89
Normal IQ	→	90-109
Superior	→	110-119
very Superior	→	120-139
Near Genius	→	≯140

Mental Retardatn classificatn

Normal IQ	≥ 70		
Mild MR	50 - 69	→	70% [MC]
Moderate MR	35 - 49	→	20 - 30%
Severe MR	21 - 39		
Profound MR	≤ 20		

MCC MR in india → Down's syndrome

NATIONAL MENTAL HEALTH PROGRAMME 1982

AIMS

1. Preventn & Rx of MH Disorders
2. use of MH technology to improve health
3. Applicatn of mental health principles in development & to improve quality of life

OBJECTIVES

1. Availability & accessibility for ALL
2. Applicatn of MH Knowledge in general H. care
3. To promote community participatn in MH

LEGISLATION

The mental Health Act 1987 → The MH care Act 2011

Mental Health Disorders in India

→ mc MH Disorder → unipolar depression
Alcohol disorders
Schizophrenia
Bipolar disorders

→ mcc Death among MH Disorders → Alzehimer's & other dementias
→ DALY's lost d/t U. depression → 64,963 [1400 DALY's lost /1,00,000 populations]
→ Mc substance abused → Tobacco
Mc Narcotic substance abused → cannabis
→ mental morbidity → 18 - 20/1000 populatn

cannabis

SUICIDES in India

→ Rate → 10.3 / 100000 populatn
→ MC mode → Hanging

HEALTH PLANNING & MANAGEMENT

DEFINITIONS

HEALTH PLANNING → Orderly process of defining community health problems, identifying unmet needs, surveying the resources to meet them, establishing realistic feasible priority goals, projecting administrative act^n to accomplish the programme

Resources → Stock or supply of man power, money, materials, skills, knowledge, techniques & time that can be drawn by a person or organisat^n in order to funct^n effectively

OBJECTIVES → Precise, specific PRE-PLANNED end point of all activities in a health program

90/90 → >90% case detect^n Rate

> 90% cure rate

TARGET → Degree of achievement of objectives with a time line

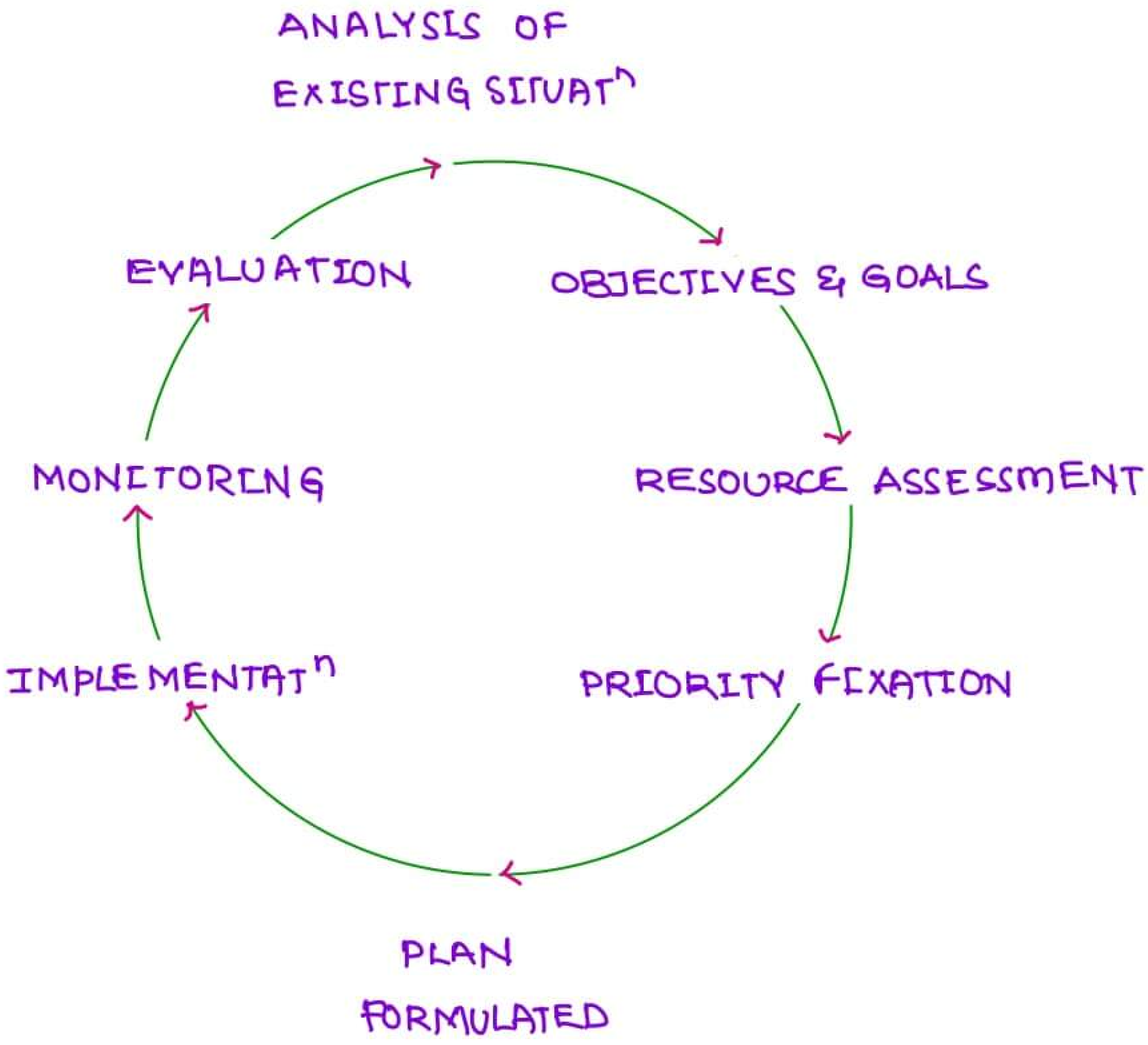
GOAL → Ultimate desired state in a H. programme towards which Objectives & resources are directed

CONTROL OF TB

All or None phenomenon

Not constrained by time & resources

PLANNING CYCLE - AORP – PRIME [mnemonic]



HEALTH PLANNING COMMITTIES

BHORE COMMITTE [1946] / H-survey & Development committe

1 Short term plan → 1 PHC / 40,000 populatⁿ
2 Long term plan → PHC 75 bedded
[3 million plan] Sec. Health unit 650 bedded
Tertiary Health unit 2500 bedded
3 Social Physician → 3m / 12m internship post MBBS in PSM
4 School health
5 Comprehensive H.care concept
  a. Promotive → Primordial level
  b. Preventive → Primary level
  c. Curative → Secondary level

BALWANT RAI MEHTA COMMITTE [1957]

1. Panchayati Raj Institutions [PRI's]
2. 3 tire rural health infrastructure
  Zila Parishad → District
  Panchayat samiti → Block
  Panchayat → village

RENUKA ROY COMMITTE [1961]

→ Function of School health services [SHS]
→ Provision of school meals
→ Medical Examination c̄ involvement of parents

MODALIYAR / HEALTH SURVEY & PLANNING COMMITTE [1962]

1. 1 PHC / 40,000 populatⁿ
2. All India Health services (AIHS)
3. Strengthen districts hospitals c̄ specialist services

CHADDA COMMITTE [1963]

for maintainance phase of National malaria Eradicatⁿ Programme
1. 1 Basic health worker / 10,000 populatⁿ

MUKERJI COMMITTE [1965, 66]

1. Delink Malaria & Family planning
2. Basic health Services

JUNGALWALA COMMITTE [1967] / committe on integratⁿ of Health Services

1. Integratⁿ of health services in India
2. Equal pay for equal work
   (Specialised pay for specialised work)
3. Ban on private practice by Govt. Doctors

KARTAR SINGH COMMITTE (1973) / committe on MP workers under Health & FP

1. Multipurpose Workers
2. 1 PHC / 50,000 populatⁿ
3. 1 Male Health Supervisor, 1 female health supervisor

SRI VASTAVA COMMITTE (1975) / Group on Medical Educatⁿ & Support Manpowers

1. Bands of semi - & para - professional H. workers
2. Village Health Guides
3. H. Assistants
4. ROME SCHEME [Re Orientatⁿ of Medical Educatⁿ]
5. Referral services complex

   Primary ⟶ Secondary ⟶ Tertiary
6. Medical & Educatⁿ commission

KRISHNAN COMMITTE (1983)

1. Urban Revamping system

BAJAJ COMMITTE (1986)

1. Formulatⁿ of National Medical & Health Educatⁿ policy
2. Formulatⁿ of National Health manpower policy
3. Education commission
4. Health man power cells

HLEG COMMITTE (2011) [High level Expert Group Committe]

1. Universal health coverage
2. 3½ year MBBS Course [actually BRHC course]

HM TECHNIQUES , INVENTORY CONTROL

HM TECHNIQUES

1. Cost Benefit analysis [CBA]

→ output of a H. programme is in monetary terms

→ Eg. RNTCP 2018 saved 40 m. US $

2. Cost effectiveness analysis (CEA)

→ Output of a H. programme in terms of RESULTS

→ Eg. RNTCP 2018 saved 32000 lives

→ Comprehensive indicator of CEA QALY [Quality adjusted Life year]

3. Input output Analysis

→ Input → cost

Output → Results

Monetary

4. Systems Analysis

→ comparision of 2 or more cost effective alternatives in a H. programme

→ Eg. Sputum smear PCR

90% sensitivity 100% sensitivity

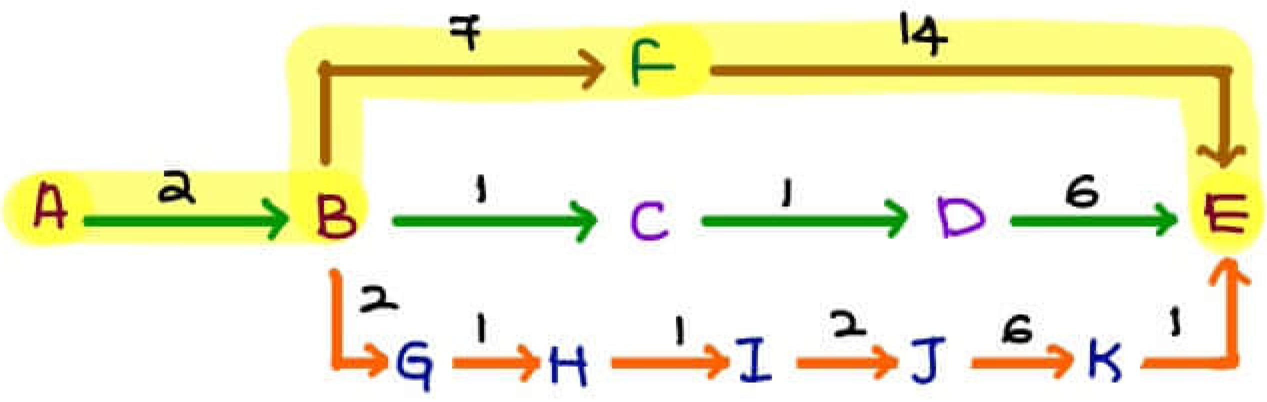
10/- 2000 - 4000/-

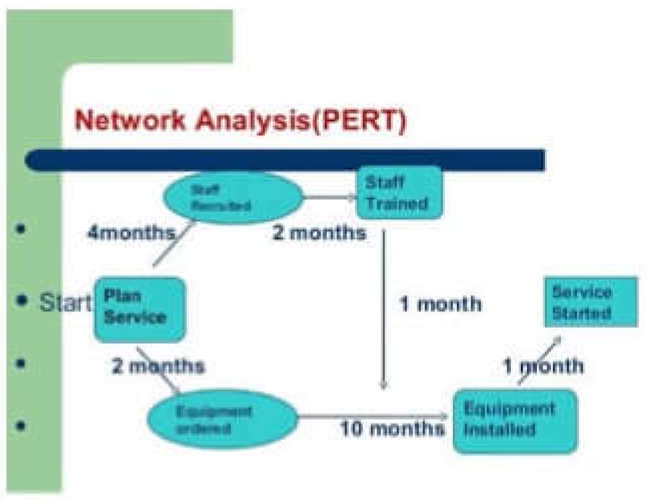
5. NETWORK Analysis

5A Pert programme Evaluatn & Review technique
5B CPM – Critical Path Method
↓
Longest

PERT → sequence of activities in a health programme to plan, schedule, monitor & furnish timely Reports

→





CPM → Critical path → Total duratn of activities which is longer

6. Cost Accounting (Financial & Resource Allocatn)

→ Provides basic data on a cost structure of a H. programme.

→ Eg.

10 m US $ RNTCP (2018-19) } 2m for Dx
5m for Rx
3m for Salary & Infrastructure

7 PPBS [Planning Programming & Budgeting System]

→ Allocatn of resources to help achieve objectives in most efficient way

ZERO Budget Approach

→ No fresh Budget allocatn until & unless previous budget is ZERO [Spent]

→ Financial year

01 ⟷ 31 March

8. Work Sampling

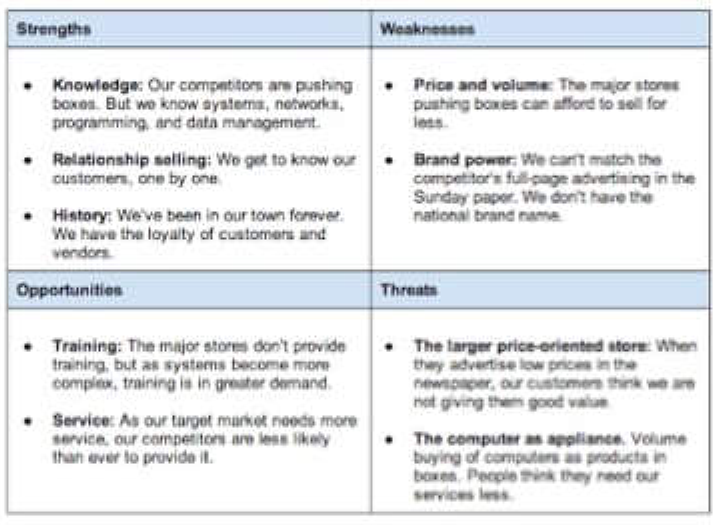
→ Systematic observatn & recording of activities of one or more individuals carried out at pre determined or Random intervals

→ Hospitals ← Doctors, Nurses

9. SWOT Analysis

RNTCP

→ Strengths ⟶ Dots 100% coverage, Rifampicin – highly bactericidal
Weaknesses ⟶ Stigma attached
Opportunities ⟶ Vaccine Research, Newer drugs
Threats ⟶ TB – HIV coinfectn, Resistance



Strengths	Weaknesses
• **Knowledge:** Our competitors are pushing boxes. But we know systems, networks, programming, and data management. • **Relationship selling:** We get to know our customers, one by one. • **History:** We've been in our town forever. We have the loyalty of customers and vendors.	• **Price and volume:** The major stores pushing boxes can afford to sell for less. • **Brand power:** We can't match the competitor's full-page advertising in the Sunday paper. We don't have the national brand name.
Opportunities	**Threats**
• **Training:** The major stores don't provide training, but as systems become more complex, training is in greater demand. • **Service:** As our target market needs more service, our competitors are less likely than ever to provide it.	• **The larger price-oriented store:** When they advertise low prices in the newspaper, our customers think we are not giving them good value. • **The computer as appliance.** Volume buying of computers as products in boxes. People think they need our services less.

INVENTORY CONTROL

→ Stocks usage & Maintainance so as to be able to meet demands c̄out any delay, avoid wastage d/t improper storage or expiry while keeping costs of holding stocks to a MINIMUM

ABC ANALYSIS

Always
Better
Control

→

	Ⓐ	Ⓑ	Ⓒ → ORS, PCM
BUDGET	70%	20%	10%
No. of Items	10%	20%	70%

VED Analysis

Vital Drugs / items
Essential Drugs / items
Desirable Drugs / items

	Ⓥ	Ⓔ	Ⓓ
No. of items	10%	40%	50%
Absence be tolerated	can't be	Some time	Long time

SDE ANALYSIS

Scarcely available
Difficulty available
Easily available

FSN Analysis

Fast moving → ORS, PCM
Slow moving → Doxycycline
Non moving → Adrenaline

GOLF ANALYSIS

Govt controlled Supplies
Open market Supplies
Local supplies
Foreign market Supplies

HML ANALYSIS

High cost
Medium cost
Low cost

SOS ANALYSIS

Seasonal
Off - seasonal

EOQ ANALYSIS

Economic order Quantity

XYZ ANALYSIS

X High investment
Y moderate investment
Z Low investment

BIO STATISTICS

VARIABLES & SCALES

BIOSTATISTICS

→ Applicat^{n} of statistics to a wide range of topics in Medicine, biology & Public health

VARIABLES

→ Any thing which can have a different value

classifications

QUANTITATIVE can be measured & can be compared	QUALITATIVE can't be measured & can't be compared
Weight, Height, Hb, B. Sugar, S. Cholesterol, Pulse Rate, SBP, BMI, °C/°F, Age, Mid arm circumference, Parity, Income	Pain, ABO grouping, Rh system, Diabetes, Anemia, Sex, Religion

CONTINUOUS many possible values & inbetween values	DISCRETE few possible values & No inbetween values
Weight, Height, Hb, B. Sugar, SBP, °C/°F, Pulse Rate → 145 beats/2m → 72.5 bpm Age, Mid arm circumference, BMI	ABO grouping, Rh status, Sex, Parity, Religion, Anemia $\begin{cases}\to \text{yes}\\ \to \text{NO}\end{cases}$, Types of Anemia Severity of Anemia

DICHOTOMOUS only 2 possible values	POLYOTOMOUS >2 possible values
Rh status, Blood group B $\begin{cases}\to \text{yes}\\ \to \text{NO}\end{cases}$ Obesity, Anemia	Weight, Height, Hb, B. Sugar, S. cholesterol, BMI, Pulse Rate, SBP, ABO grouping, Sex, Type of Anemia, Severity of Anemia, TNM Staging, Age, Religion, Parity, °C/°F

→ Weight → Quantitative ⊕ Continuous ⊕ Polyotomous
ABO → Qualitative ⊕ Discrete ⊕ Polyotomous
Rh → Qualitative ⊕ Discrete ⊕ Dichotomous
Parity → Quantitative ⊕ Discrete ⊕ Polyotomous
Age → Quantitative ⊕ Continuous ⊕ Polyotomous
Religion → Qualitative ⊕ Discrete ⊕ Polyotomous

SCALES OF MEASUREMENT

CATEGORICAL		DIMENSIONAL
NOMINAL	ORDINAL	METRIC
Names	Order	Measurement
ABO, Rh Anemia, Types of Anemia Sex	TNM staging of cancer Severity of Anemia HTN classificatⁿ	Weight, Height, Hb, B.Sugar, PR, SBP, BMI, S. cholesterol, Age, °C/°F, Parity

→ most of Qualitative scales, measured on categorical scale
most of Quantitative scales, measured on Metric scale

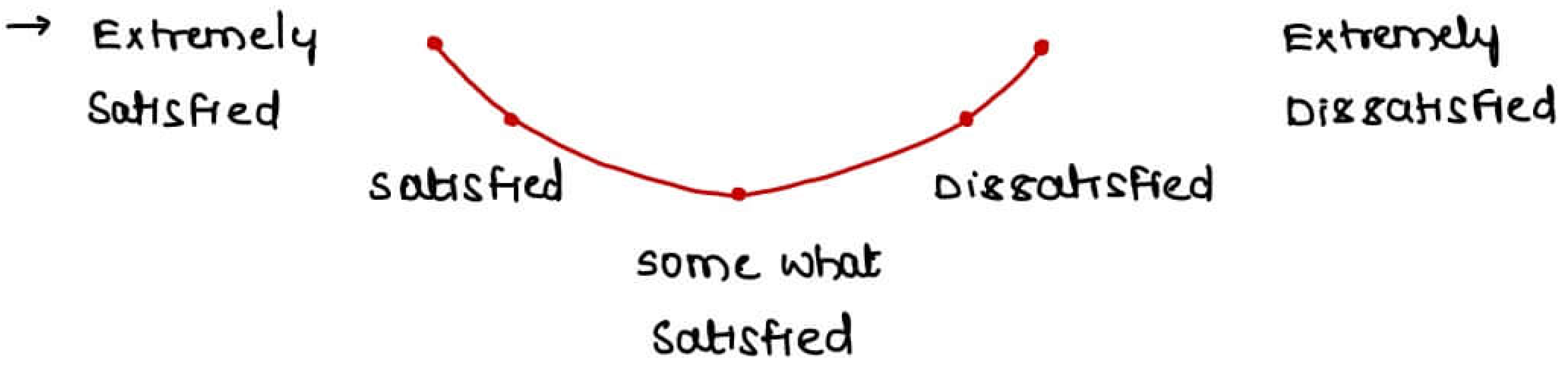
→ statistically most preferable scale → METRIC > Ordinal > Nominal

METRIC SCALE

INTERVAL	RATIO
No Ratios are possible, Have no absolute zero °C/°F Temp	Ratios are possible, Have absolute zero Weight, Height, Hb, B.Sugar, S. cholesterol, BMI, Pulse Rate, SBP Kelvin Temperatures

→ majority of metric variable should be measured on Ratio scale except °C/°F

LIKERT SCALE



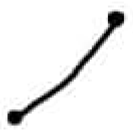
→ Type of Ordinal Scale
→ Based on CONTINUUM OF Response

GUTTMAN SCALE

→ statements of increasing intensity
→ Type of Ordinal Scale
→ Based on continuum of Response

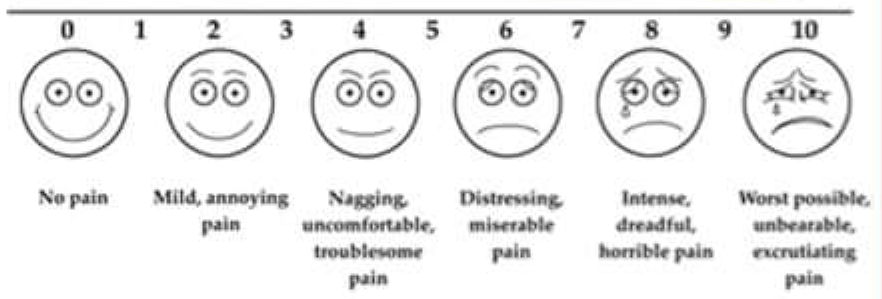
ADJECTIVAL SCALE

→ Grammatical words of increasing intensity
→ Hot — warm — Lukewarm, chill — cool — pleasant
→ Type of ordinal scale, based on continuum of response

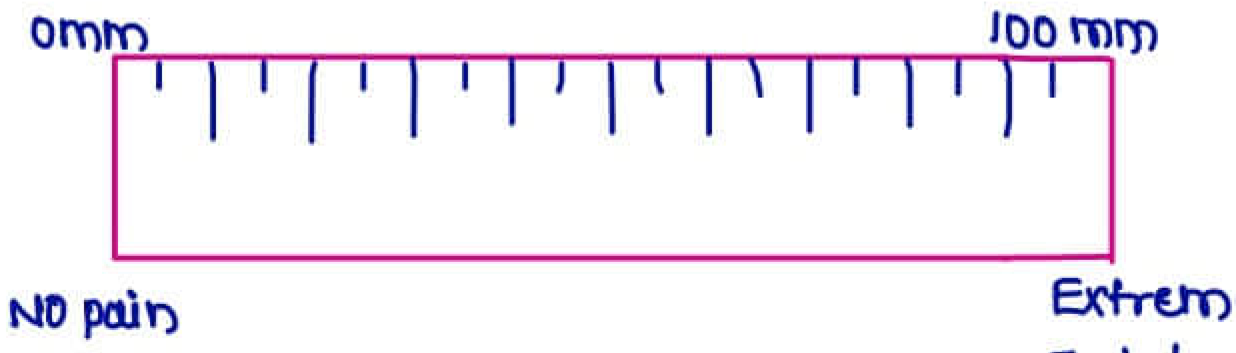
LIKERT SCALE	GUTTMANN SCALE	ADJECTIVE SCALE
→ Words	→ complete sentences	→ Words
→	→ 	→
Bidirectional	unidirectional	unidirectional

VISUAL ANALOG SCALE [VAS]

→ used for measurement of pain


0
1
2
3
4
5
6
7
8
9
10
No pain
Mild, annoying pain
Nagging, uncomfortable, troublesome pain
Distressing, miserable pain
Intense, dreadful, horrible pain
Worst possible, unbearable, excrutiating pain

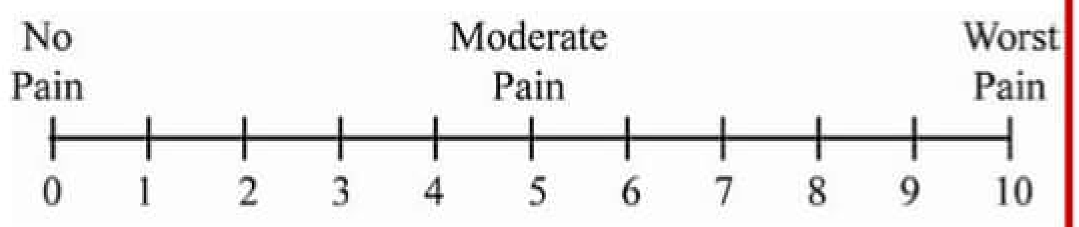
→

→ 

Extreme Intolerable pain

→ used when
pt is illeterate, ICU, Under anesthesia, pediatric pts.

→ preferred



CENTRAL TENDENCY, DISPERSION

MEASURES OF CENTRAL TENDENCY

Mean → $\frac{\text{Sum of all the observations}}{\text{No. of observations}}$ $\frac{\text{Sum}}{n}$

→ statistical Average

Median → middle value in ascending order [n = odd] or
Average of 2 middle values in Ascending order [n = even]

Mode → most frequent value

Ⓠ Marks scored by 9 students
9, 1, 3, 3, 0, 4, 8, 7, 6

Mean → $\frac{41}{9}$ → ④.5

Median → 0, 1, 3, 3, ④, 6, 7, 8, 9

Mode → ③

Ⓠ Marks scored by 10 students
9, 1, 3, 3, 0, 4, 8, 7, 6, 9

Mean → $\frac{50}{10}$ → ⑤

Median → 0, 1, 3, 3, $\boxed{\frac{4, 6}{2}}$, 7, 8, 9, 9 → ⑤

Mode → 3 & 9 → Bimodal Distribut^n

$\frac{3+9}{2} = 6$ → unimodal Distribut^n

MEDIAN

→ n = odd

$$\boxed{\left[\frac{n+1}{2}\right]^{th} \text{ value}}$$

→ n = even

$$\boxed{\frac{\left[\frac{n}{2}\right]^{th} + \left[\frac{n}{2}+1\right]^{th}}{2}}$$

→ Mean > Median > Mode

Statistically most preferable measure of central tendency → Mean

→ Best measure of central tendency, if Data is

- Nominal	→ Mode
- Ordinal	→ Median
- Metric	→ Mean
- Skewed metric	→ Median

- OUTLIERS
- Wt of 6 students of a class

50, 46, 48, 50, 52, 54 → Mean ✓

50, 46, 48, 50, 52, 154 → Median ✓

OUTLIER

- Test used for identificatⁿ of outliers

DIXON'S Q TEST

GRUB'S TEST [used for normal distributed data]

CHAUVENET'S CRITERION

PIERCE CRITERION

Ⓠ Mean Hb → 12

Median Hb → 13

Mode Hb → ?

→ $\boxed{\text{MODE} \rightarrow 3 \text{ Median} - 2 \text{ Mean}}$ → only applicable for Bimodal Distributⁿ

→ Mode → 3 (13) − 2 (12) → 15

Ⓠ n = 20 students

One student ĉ highest weight [58 kg] was recorded 85 kg

Mean → increases

Median → SAME

Mode → SAME

DISPERSION

→ Spread of (or) scattering of values around a central value in a data distributⁿ

→ Measured by

Individual Observations	Samples
Range	Standard Error
Interquartile Range	SE of mean
Mean deviation	SE of difference b/w two means
Standard deviation [mc used]	SE of Proportion
co-efficient of variatⁿ	SE of difference b/w two proportions
variance	

STANDARD DEVIATION [σ]

→ Deviatⁿ of each value from the standard value [Mean]

→ n = 100

Mean wt = 60kg

			Ⓓ	D^2
W_1	=	64kg	+4	16
W_2	=	56kg	−4	16
W_3	=	62kg	+2	4
W_4	=	60kg	0	0
|		|	|	|
W_{100}				

Total SD = ZERO
↓
[Limitation]

RMSD [Root of Mean of squares of Deviatⁿ]
↓
STANDARD DEVIATION

$\sqrt{\frac{\text{SUM}}{n}} = 5\text{kg}$

STANDARD ERROR

→ Deviatⁿ of each sample mean from the populatⁿ mean

→ Sample mean is known as Statistic

Populatⁿ mean is known as Parameter

Q. n = 100

Wt follow Ⓝ distributⁿ

Mean wt = 50kg

SD of wt = 1 kg

SE_{Mean} = ?

→ $\boxed{SE_{Mean} = \frac{SD}{\sqrt{n}} = \frac{\sigma}{\sqrt{n}}}$

$= \frac{1\text{kg}}{\sqrt{100}} = 0.1\text{ kg}$

Ⓠ Weight follows Ⓝ Distributⁿ

$n_1 = 100$ $n_2 = 200$

$M_1 = 50$ kg $M_2 = 60$ kg

$SD_1 = 1$ Kg $SD_2 = 3$ Kg

SE of Difference b/w 2 sample means = ?

→ $\boxed{\text{SE of difference b/w 2 sample means} \rightarrow \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$

$$\rightarrow \sqrt{\frac{1^2}{100} + \frac{3^2}{200}} \quad \rightarrow \sqrt{\frac{1}{100} + \frac{9}{200}}$$

Ⓠ Weight follow Ⓝ distributⁿ

$n = 100$

$M_{wt} = 50$ Kg

40% obese

$SE_W = ?$

→ $\boxed{\text{SE of proportion} \rightarrow \sqrt{\frac{pq}{n}}}$

p = given proportion

q = 1 − p

$$\rightarrow \sqrt{\frac{0.4 \times 0.6}{100}}$$

Ⓠ Wt follows Ⓝ Distributⁿ

$n_1 = 100$ $n_2 = 200$

$M_1 = 50$kg $M_2 = 60$

40% Obese 30% Obese

→ $\boxed{\text{SE of difference b/w two proportions} \rightarrow \sqrt{\frac{P_1q_1}{n_1} + \frac{P_2q_2}{n_2}}}$

$$\rightarrow \sqrt{\frac{0.4 \times 0.6}{100} + \frac{0.3 \times 0.7}{200}}$$

→ SE does not depend on Mean

VARIATION / VARIABILITY

→ $\boxed{\text{Co-efficient of variatⁿ [COV]} \rightarrow \frac{\sigma}{M} \times 100}$

Weight follows Ⓝ Distributⁿ

$n_1 = 100$ $n_2 = 200$

$M_1 = 50$ kg $M_2 = 60$ kg

$SD_1 = 1$ Kg $SD_2 = 3$ Kg

Which sample is more Variation

→ $COV_1 \to \frac{1}{50} \times 100 = 2\%$ → $COV_2 \to \frac{3}{60} \times 100 = 5\%$

→ 2 sample has more variation than 1st sample

Variance

Ⓠ Weight follows Ⓝ Distribut^n

$n_1 = 100$ $n_2 = 200$
$M_1 = 50$ kg $M_2 = 60$ kg
$SD_1 = 1$ kg $SD_2 = 3$ kg

Which sample has higher variance

→ $\boxed{V = \sigma^2}$

$V_1 = 1^2$ $V_2 = 3^2$ $\Longrightarrow V_2 > V_1$

Precision

Ⓠ Weight follows Ⓝ Distribut^n

$n_1 = 100$ $n_2 = 200$
$M_1 = 50$ kg $M_2 = 60$ kg
$SD_1 = 1$ kg $SD_2 = 3$ kg

→ $\boxed{\text{Precision} = \frac{1}{SE} = \frac{\sqrt{n}}{\sigma}}$

$P_1 = \frac{\sqrt{100}}{1} = \frac{10}{1}$; $P_2 = \frac{\sqrt{200}}{3} = 4.5$

$P_1 > P_2$

Range

→ Max Value − Minimum Value OR
expressed as Minimum to maximum

→ Eg − min → 40 kg
max → 100 kg
Range → 60 kg or
40 − 100 kg

Relative Deviate [Z Score]

Ⓠ n = 100
Hb shows N Distribut^n
Mean Hb = 13.5 g/dl
SD Hb = 1.5 g/dl
Z score of a student whose Hb is 15 g/dl ?

→ $Z\ \text{Score} = \dfrac{x-\mu}{\sigma}$

x = given value
μ = mean value

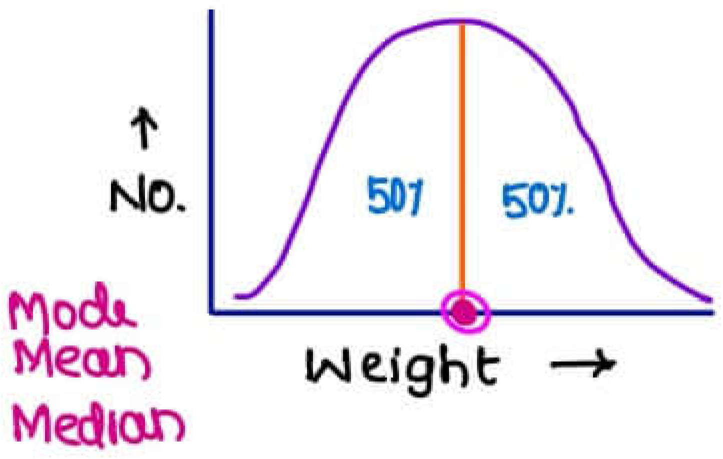
$$= \frac{15.0 - 13.5\ g/dL}{1.5\ g/dL} = 1$$

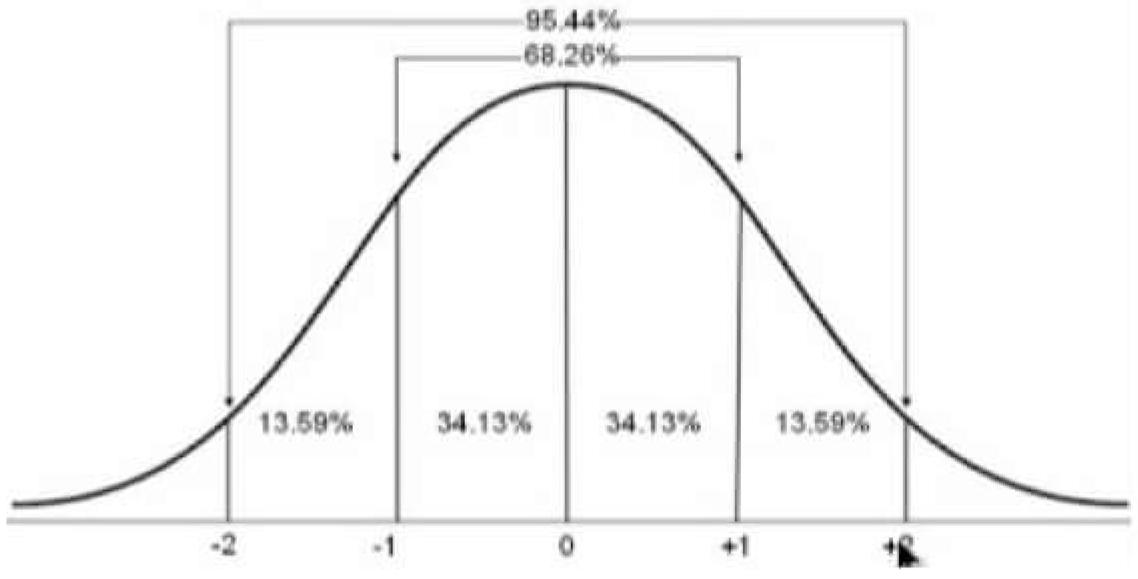
$Z = 1$ → Relatively deviated from mean value

→ Z score can be negative, zero also.

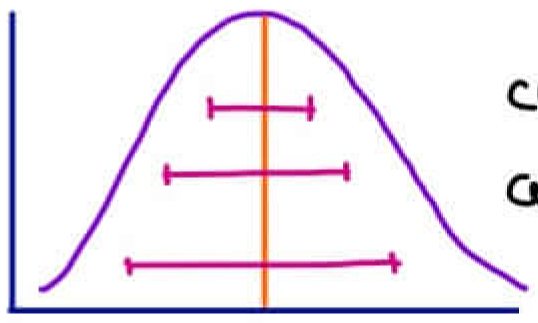
NORMAL DISTRIBUTION & SKEWED DISTRIBUTION

NORMAL / GAUSSIAN / STANDARD DISTRIBUTION





1. B/L symmetrical Bell shaped curve
2. Mean = Median = Mode → known as coincidence
3. If Mean = 0 in Normal Distribut^n then SD is 1

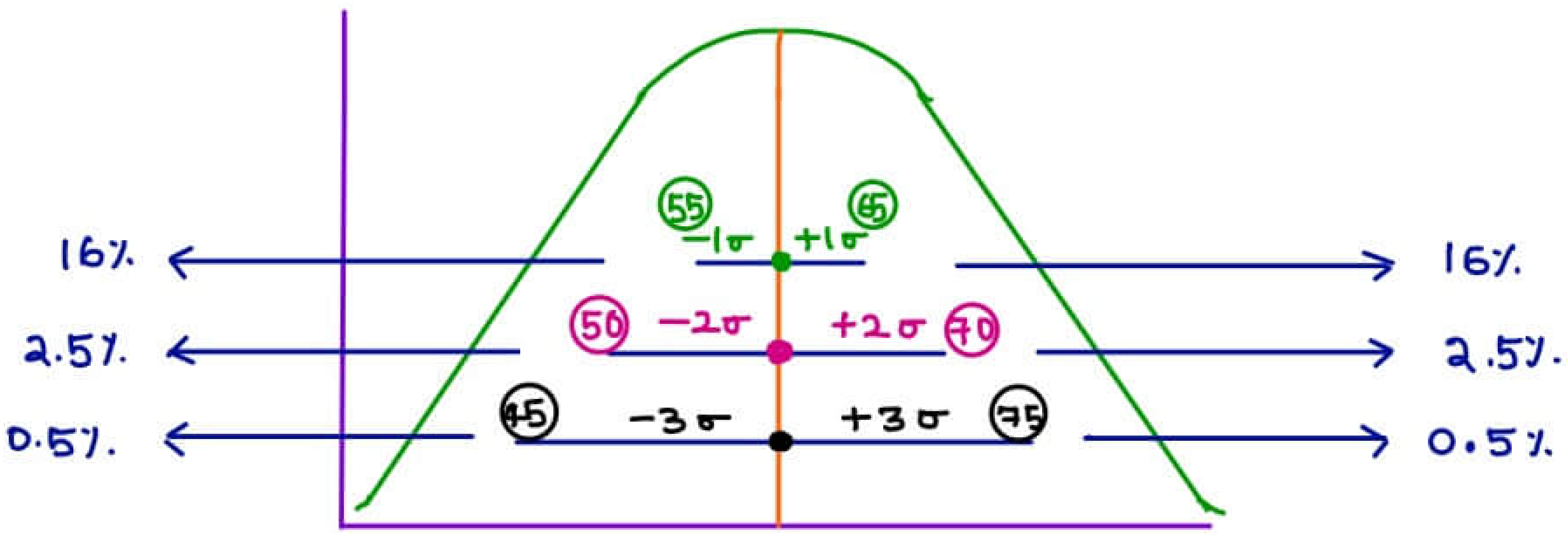


4. Mean ± 1SD covers 68% value [68.3%]
5. Mean ± 2SD covers 95% value [95.4%]
6. Mean ± 3SD covers 99% value [99.7%]

Ⓠ WND,
n = 100
Mean wt = 60 Kg
SD W = 5 kg

Q1 95% Student weight lie b/w → 50 Kg to 70 kg

→ M ± 2 SD = 95%
60 ± 2 [5] = 95%
60 ± 10 = 95%



Q2. 68% students weight lies b/w 55 Kg to 65 Kg

→ M ± 1SD = 68%

60 ± 5 = 68%

Q3. 99% students weight lies b/w 45 Kg to 75 Kg

→ M ± 3 SD = 99%

60 ± 3 (5) = 99%

60 ± 15 = 99%

Q4. How many students will have wt >60 Kg → 50%

Q. n = 300 show Normal Deviatⁿ

Mean wt = 70 Kg

SD = 5 Kg

① 7-8 no. of students weight > 80 Kg

→ 70 ± 1 (5) = 68% → 65 - 75 Kg

70 ± 10 = 95% → 60 - 80 Kg   2.5% ⟵ [60 - 80] ⟶ 2.5%.

70 ± 15 = 99% → 55 - 85 Kg   • 2.5% of 300 = 7-8

② 48 no. of Students weight <65 Kg

→ 70 ± 5 = 68% → 65-75 Kg

16% ⟵| 65 - 75 |⟶ 16%

16% of 300 = 48

Q. ∞ [None] SD covers all 100% values in a ND

→ M ± 1SD = 68%

M ± 2SD = 95%

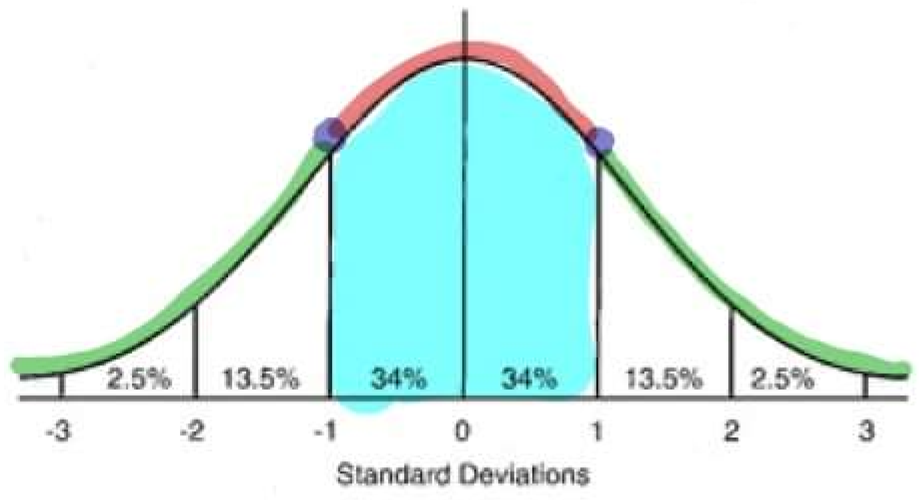
M ± 3SD = 99.7

⋮

∞

- Graph never touches base line → floating graph

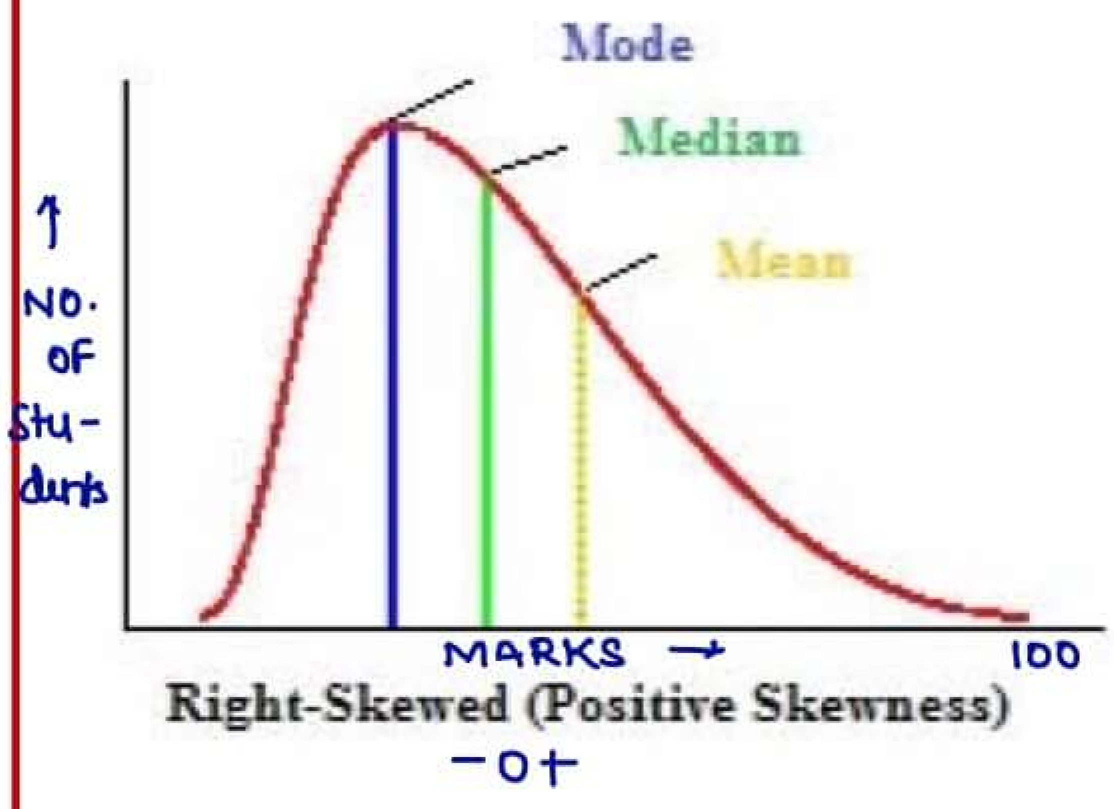
Point of Inflectⁿ



Point of Inflection

- Where top convex become concave on side
- locatⁿ of point of inflection on x axis is about 1 SD
- Area covered by the points of inflectⁿ is 68%.

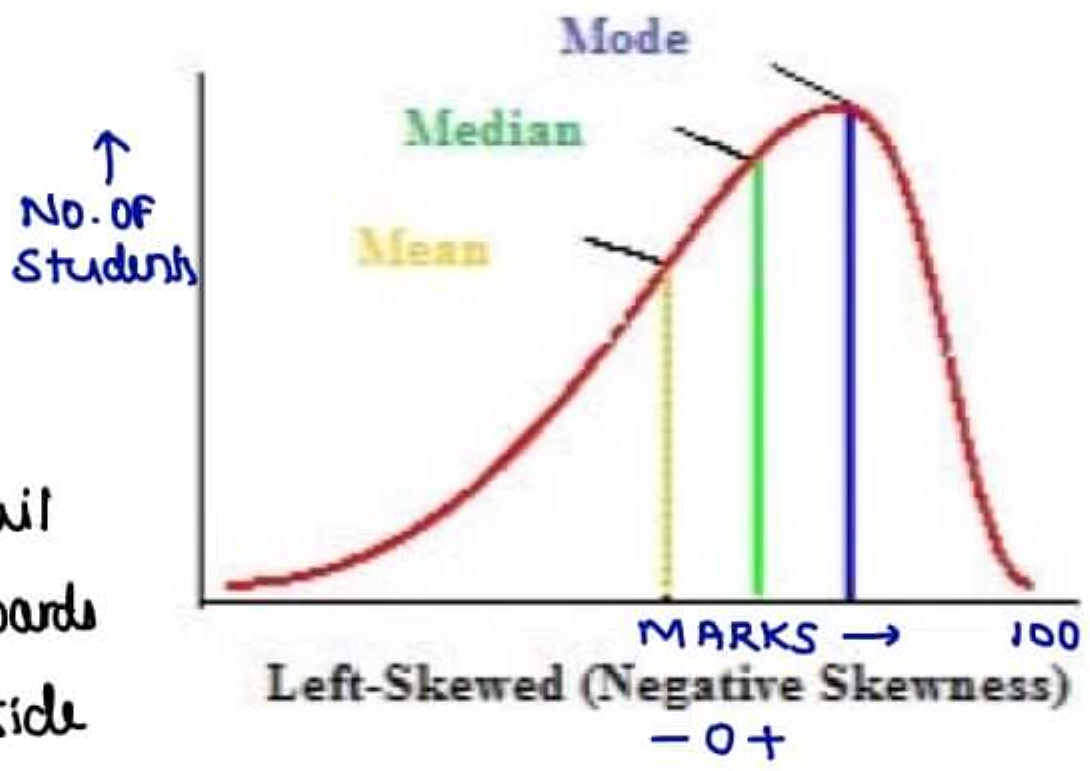
SKEWED DISTRIBUTIONS



Right-Skewed (Positive Skewness)

Longer tail going towards Rt/ +ive side

Longer tail going towards Lt/ -ive side



Left-Skewed (Negative Skewness)

DIRECTION OF LONGER TAIL DECIDES THE DIRECTION

→ Majority of students fail an exam c̄ low marks → Rt/ +ive skewed

→ Majority of students pass an exam c̄ high marks → Lt/ -ive skewed

CLUSTERING OF VALUES ON LOWER SIDE - RIGHT SKEWED CURVE

CLUSTERING OF VALUES ON HIGHER SIDE - LEFT SKEWED CURVE

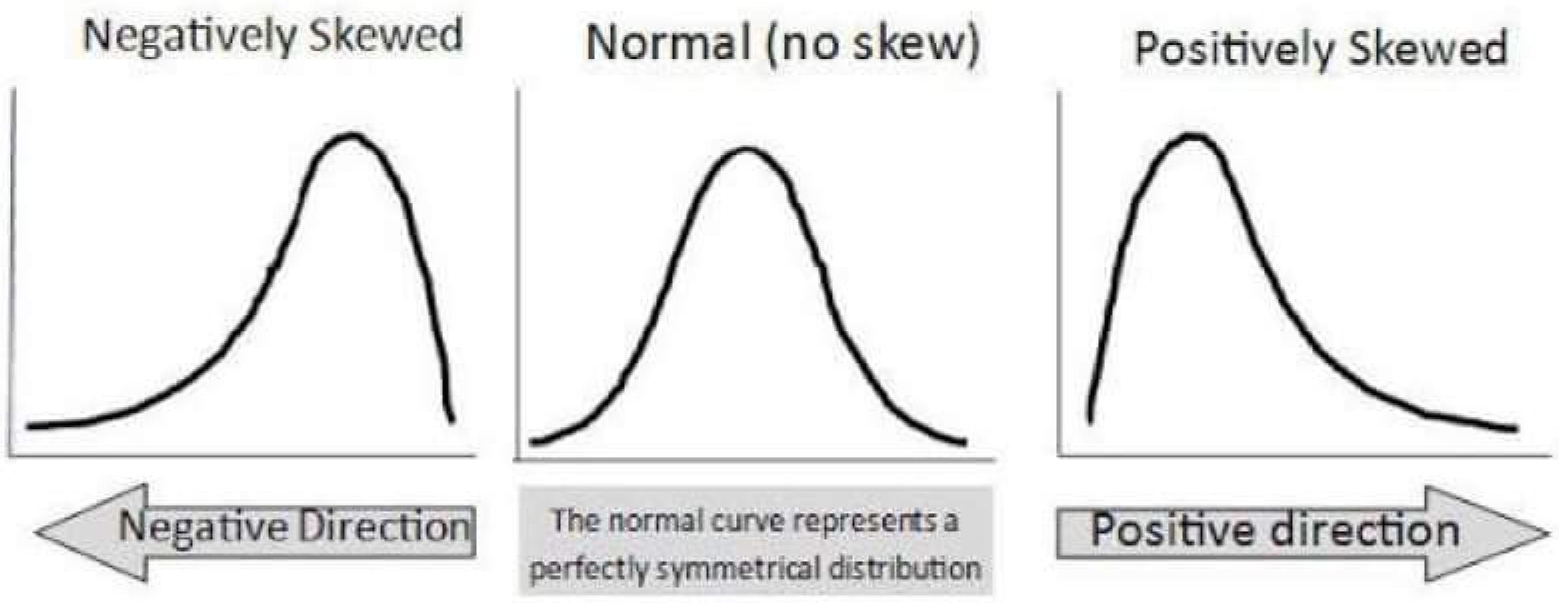
→ Mean > Median > Mode

→ Mode > Median > Mean

POISSON'S DISTRIBUTION

→ No. of events are expressed in unit time

→ No. of OPD patients / Day



STATISTICAL ERRORS , P- VALUE , CONFIDENCE INTERVALS

STATISTICAL ERRORS

NULL HYPOTHESIS [H_0]

→ Statement opposite to hypothesis

→ Eg. New Drug 'A' vs Older Drug 'B'

Null Hypothesis – New Drug A is NOT BETTER than Older drug B

REALITY

Based on Study Results		H_0 TRUE	H_0 FALSE
	Reject H_0	Type I Error	No Error
	Accept H_0	No Error	Type II Error

→ H_0 true, Rejected → Type I Error
H_0 False, Accepted → Type II Error

H_0 TRUE, Accepted → No Error
H_0 False, Rejected → No Error

→ Type I Error is more severe than Type II Error

P value → Propability of Type I Error

α → max. Threshold [permissible] of Type I Error
Globally accepted value of α → 5%

β → Propability of Type II Error

Q. Which is True ?
a. $P < \alpha$
b. $P = \alpha$
c. $P > \alpha$
[✓ d.] Any of above

Q. Which you want to study
[✓ a.] $P < \alpha$
b. $P = \alpha$
c. $P > \alpha$
d. any of the above

→ If $P < \alpha$ → Results are Significant
P value should be < 5% [0.05]

Ⓠ In Cohort Study I, RR = 8, in Smoking Study to cancer, P value = 0.07,
conclusion → Insignificant Results

Ⓠ CS II, RR = 6, P value = 0.04 → Significant Results

Ⓠ CS III, RR = 5.2, P value = 0.02 → MORE Significant Results

CONFIDENCE LEVEL [1 − α]

- → Probability that value of a parameter falls in a specific range.
- → confidence level can be ↑ed by ↓ing α.
- → for significant result → 1 − 0.05 = 0.95 ➞ 95%

Ⓠ CS I, RR = 8, [CL = 93%] → Insignificant

Ⓠ CS II, RR = 6, [CL = 96%] → Significant, Ⓠ CS III, RR = 5.2, [CL = 99%] → more significant

POWER OF A STUDY [1 − β]

- → power of study ↑ed by ↓ing β
- → Probability that a test will reject a false Null Hypothesis

Ⓠ Probability of declaring a significant difference in a study when actually it is not present

Investigator done — Reality

→ Ho → There is no significant difference
- on Reality → True
- investigator → Rejected

} TYPE 1 ERROR

CONFIDENCE INTERVAL

- → Interval that may contain a population parameter calculated
- → Gives Estimated range of values
- → Eg.

CH I, RR = 8 [CI → 7.6 − 8.4]

- → formula

$$CI = Mean \pm Z\,[SE]$$

$$CI = Mean \pm Z\left[\frac{SD}{\sqrt{n}}\right]$$

→ $Z_{90\%}$ → 1.645

$Z_{95\%}$ → 1.96

Ⓠ n = 100

Mean GFR = 85 ml/min

SD = 25 ml/min

Range of 90% CI ?

$$\rightarrow CI_{90} = 85 \pm 1.645\left[\frac{25}{\sqrt{100}}\right]$$

$$= 85 \pm 1.645 \times 2.5$$

$$= 81 - 89$$

larger the sample size, narrowers the CI
Narrower CI is preferable as it tells more precisely that what might be the pop. mean

STATISTICAL TESTS

PARAMETRIC TEST OF SIGNIFICANCE

- → Normal Distributions
- → Quantitative
- → Means, SD
- → paired student's t test
  unpaired student's t test
  ANOVA [F-test]

NON PARAMETRIC TEST OF SIGNIFICANCE

- → Non normal Distributions
- → Qualitative
- → %, fractions
- → SIGN Test
  CHISquare TEST

PARAMETRIC TESTS → used to compare Means, SD in

PAIRED STUDENT'S t TEST → Paired Data [1 Group]

UNPAIRED STUDENT'S t TEST → Unpaired Data [2 Groups]

ANOVA [F-Test] → unpaired Data [≥ 3 Groups]

NON PARAMETRIC TESTS → used to compare % or fractions in

SIGN TEST → Paired Data [1 Group]

CHI SQUARE TEST → Unpaired Data [≥ 2 Groups]

→ Sign test analogous to → Paired student t test

chisquare test analogous to → Unpaired student t test
Anova [F – Test]

Ⓠ n = 10
Mean SBP = 142 mm Hg
Drug H × 2 months
Mean SBP = 126 mm Hg

Paired student t test

Ⓠ n = 10
Mean SBP males = 142 mm Hg
Mean SBP females = 126 mm Hg

Unpaired student t test

Ⓠ n = 10
MSBP Ward 1 = 142 mm Hg
MSBP Ward 2 = 126 mm Hg
MSBP Ward 3 = 132 mm Hg

ANOVA [F-Test]

Ⓠ n = 100
46 % HTN
Drug H × 2 months
26 % HTN

SIGN TEST

Ⓠ n = 100
40 % Males HTN
26 % females HTN

CHI SQUARE TEST

Ⓠ n = 100
Ward 1 40% HTN
Ward 2 26% HTN
Ward 3 11% HTN

CHI - SQUARE TEST

Z test

- → variation of t test
- → used only if $n \geq 30$

Ⓠ $n = 100$

Mean Hb = 11.2 g/dl

IFA x 12 m

Mean Hb = 12.7 g/dl

z - test

Ⓠ

Mean Hb = 11.2 g/dl

IFA x 12 m

Mean Hb = 12.7 g/dl

t - test > z - test

Fischer's Exact test

- → variat^n of chi - square test
- → used only if $n < 30$

Ⓠ $n = 100$

3/4 th Males anemic

1/3 rd Males anemic

CHI - SQUARE TEST

Ⓠ $n = 20$

3/4 th males anemic

1/3 rd females anemic

FISCHER'S EXACT TEST

Ⓠ

3/4 th males anemic

1/3 rd females anemic

CHI - SQUARE TEST > Fischer's Exact Test

CHI- SQUARE TEST

→ Degrees of freedom [DOF]

$\boxed{DOF = [C-1][r-1]}$ → more Accurate

Ⓠ 3x4 table, DOF = 2x3 = 6

2x2 table, DOF = 1x1 = 1

3x5 table, DOF = 2x4 = 8

4x4 table, DOF = 3x3 = 9

$\boxed{DOF = n-1}$

Ⓠ $n = 100$, DOF = 99

$\boxed{DOF = (n_1+n_2)-1}$

Ⓠ $n_1 = 60$, $n_2 = 40$; DOF = 99

→ Value of chi-square ___3.84___ for 2x2 table [DOF = 1] at 95% CL ?

CL

DOF	95%	90%	85%	80%
1	🟦			
2				
3				
4				
5				
6				

STATISTICAL GRAPHS, CORRELATION, REGRESSION, LOCATIONS

STATISTICAL GRAPHS

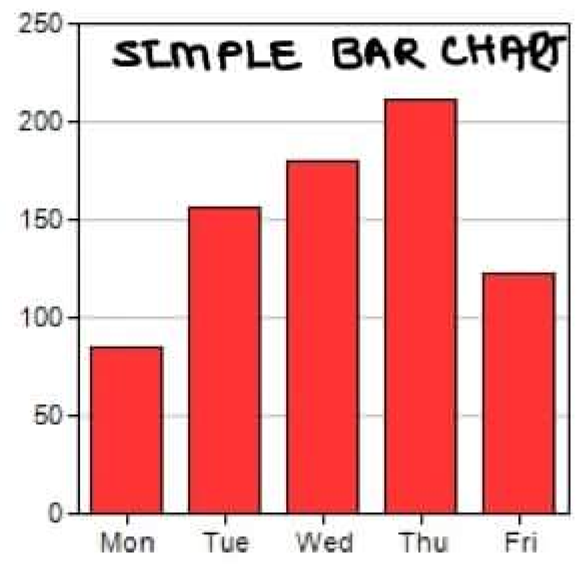
QUATITATIVE

- → Histogram
- frequency Polygon
- frequency curve
- Line chart
- OGIVE
- Scatter Diagram

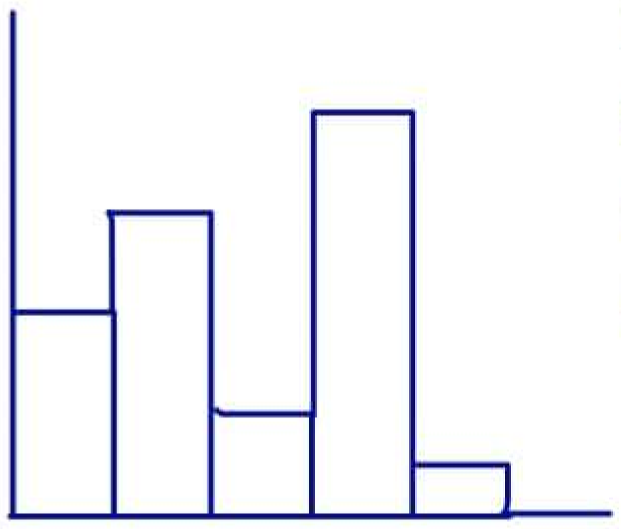
F^{2}LOSH

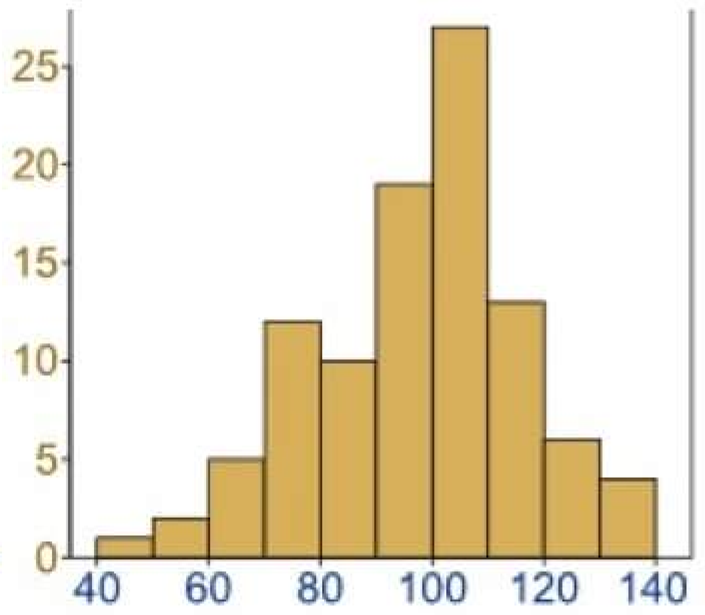
QUALITATIVE

- → Bar chart
- Pie chart
- Map
- Pictogram



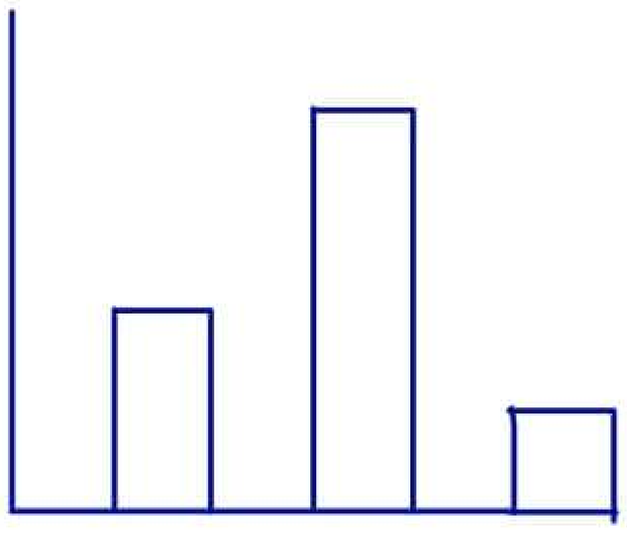
HISTOGRAM

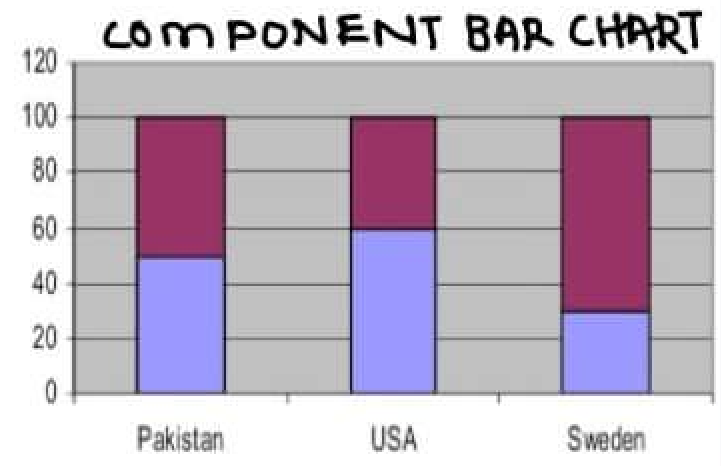


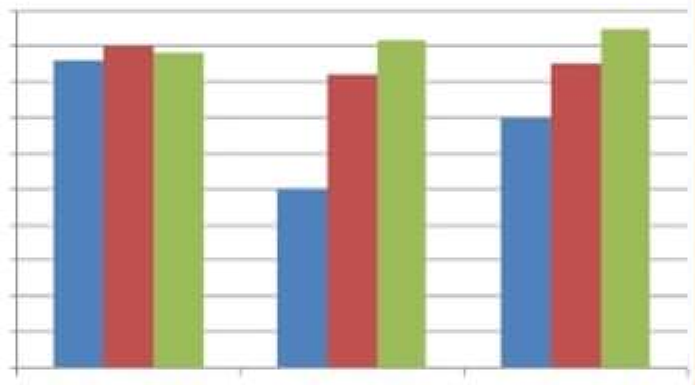


→ continuous Quantitative Data

BAR CHART



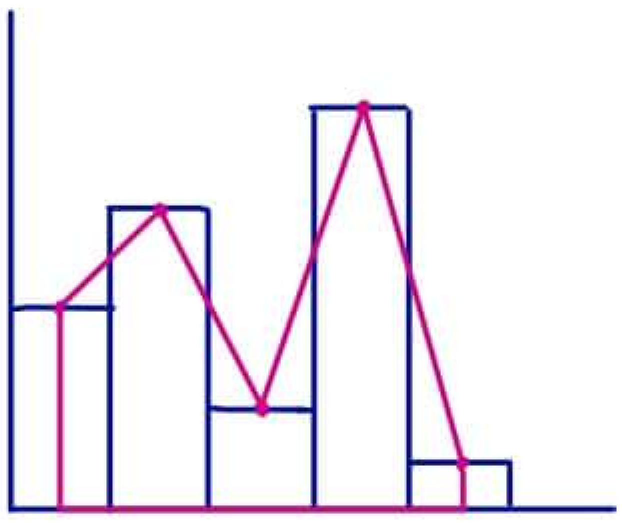


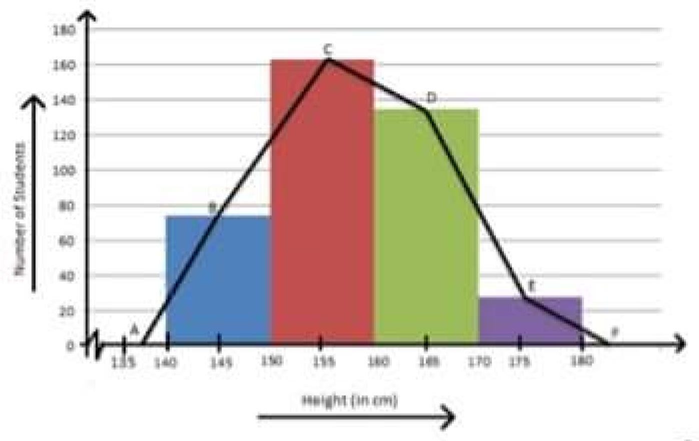


MULTIPLE BAR CHART

→ Discrete Qualitative Data

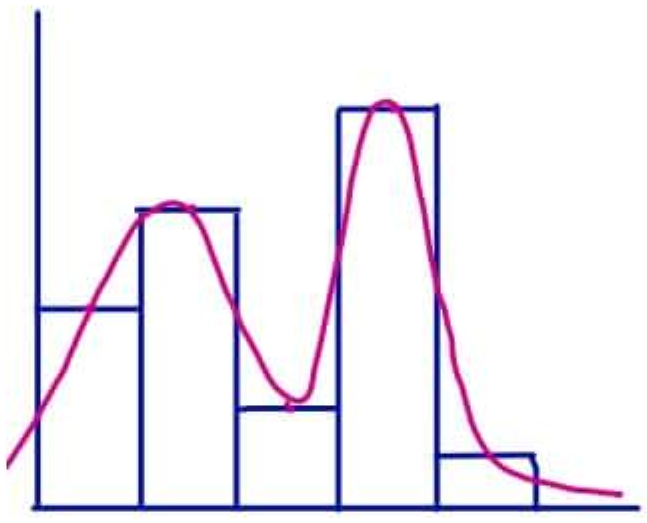
Frequency Polygon

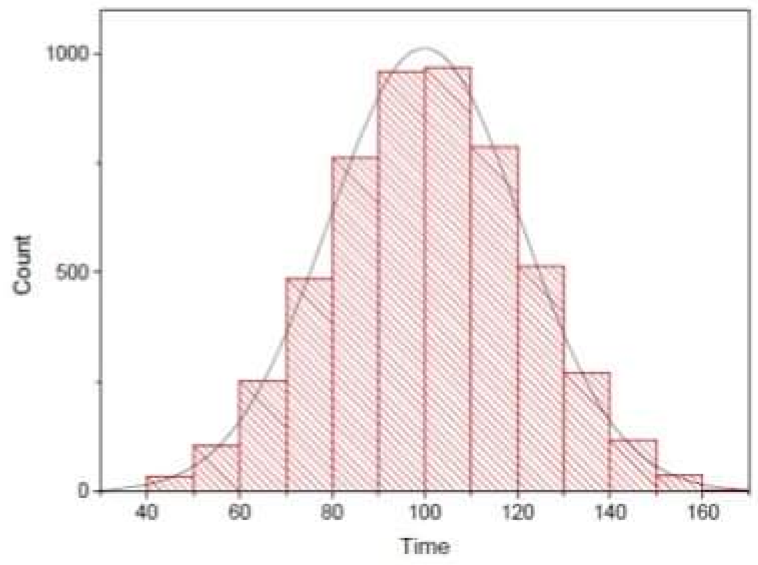




→ By joining the top middle points of each bar in a histogram by a Straight line

Frequency Curve

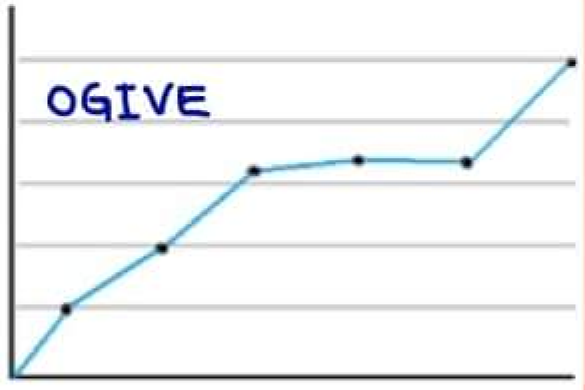




→ By joining the top middle points of each bar in a histogram by a Curve line

→ frequency polygon → frequency curve Conversion by

1. ↑ing the sample size
2. reducing the interval size on x-axis

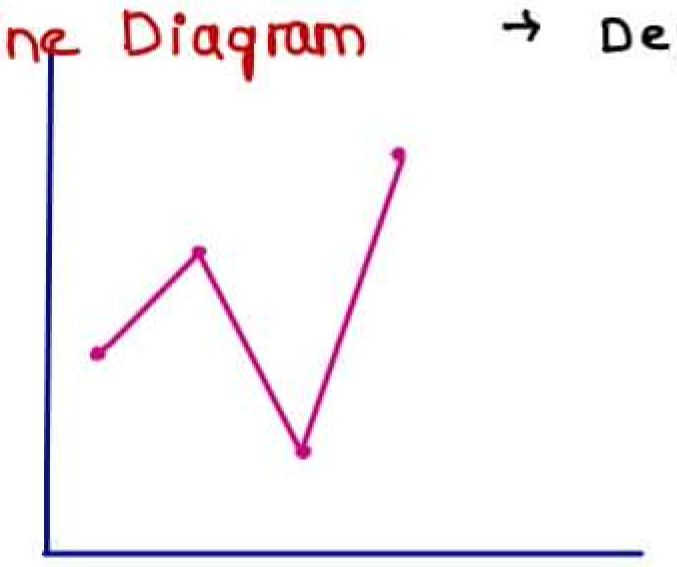


Line Diagram

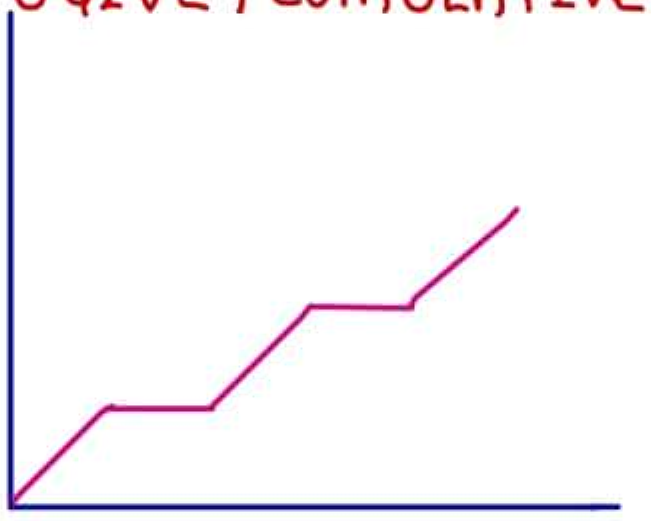
→ Depict^n of TREND

→ Differences from frequency polygon

- No closed loop
- No Histogram in the background

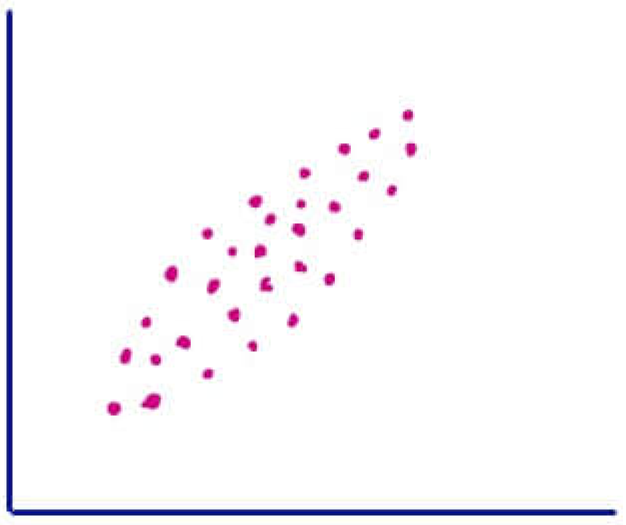


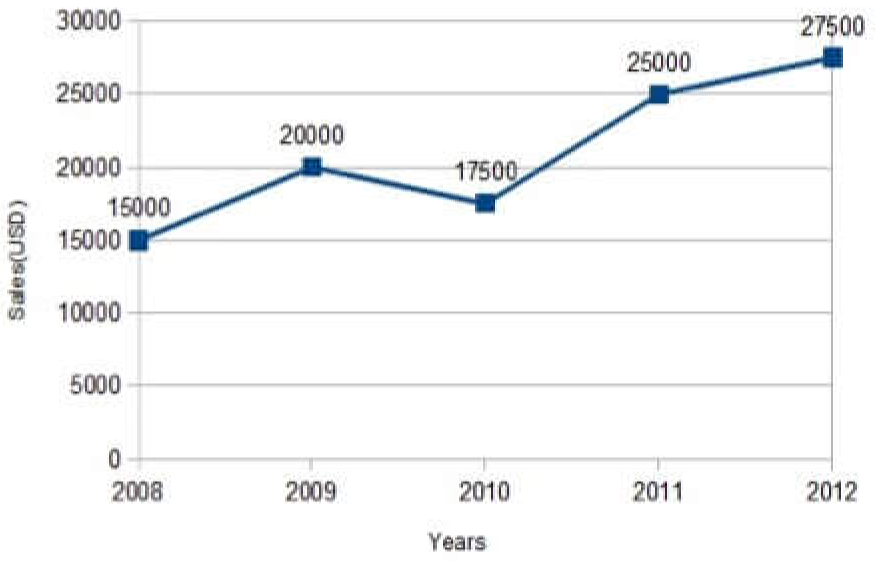
OGIVE / CUMULATIVE FREQUENCY DIAGRAMS



- frequency only ↑ses.
- No closed loop
- No Histogram on background

DOT / SCATTER DIAGRAM

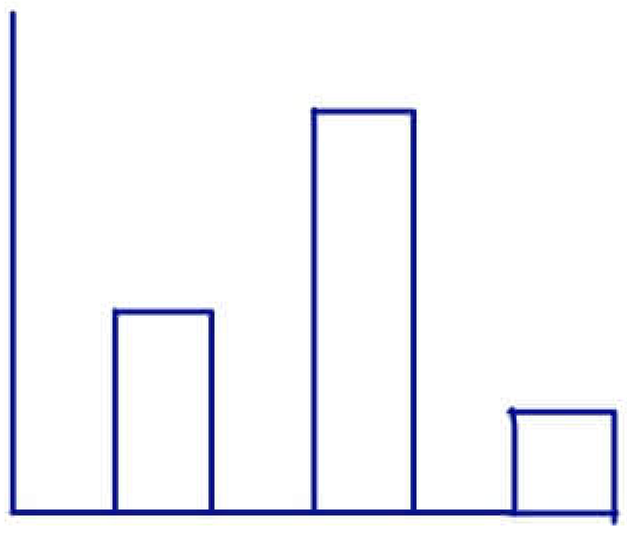




LINE DIAGRAM

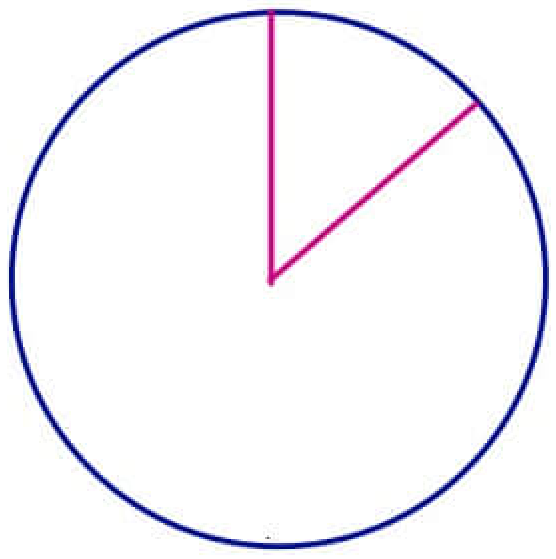
QUALITATIVE GRAPHS

BAR CHART

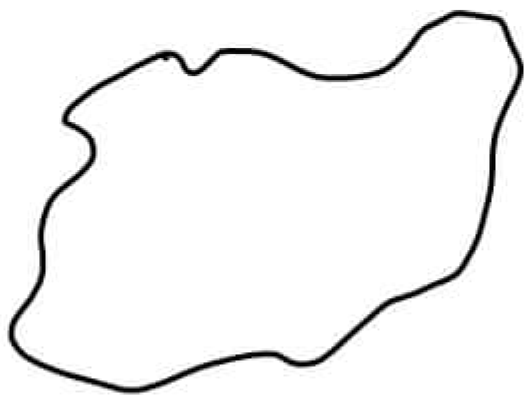


→ Discrete Qualitative Data

PIE CHART / SECTOR CHART



MAP



PICTOGRAM

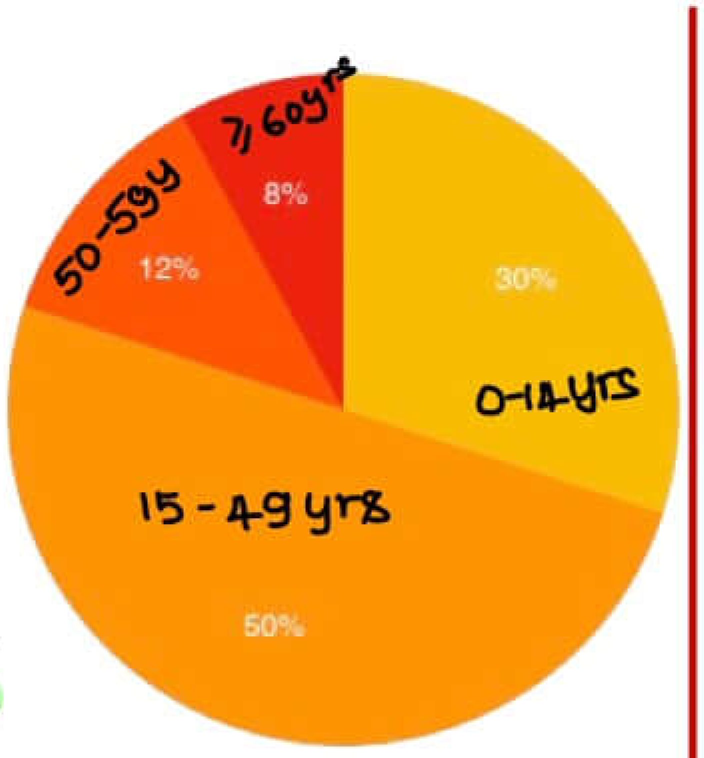
PIE CHART / SECTOR CHART

1. Total of all categories in the data must be 100% and
2. All categories must be mutually Exclusive

Q. 0-14 yr → 30%
10-19 yr → 20%
15-49 yr → 40%
≥ 50 yr → 10%
100%

→ Pie construction not possible

Q. 0-14 yrs → 30%
15-49 yr → 50%
50-59 yr → 12%
≥ 60 yr → 8%
100%



→ Pie chart construction is possible

Ⓠ If one category is missing,

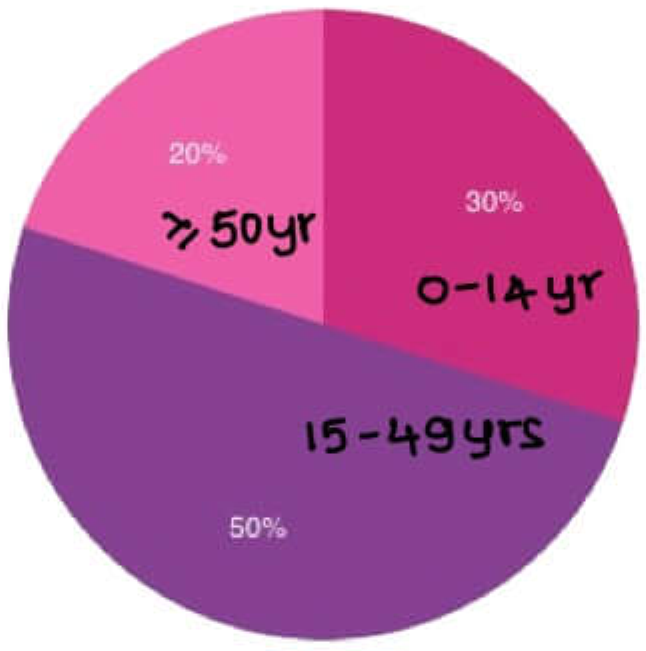
0 – 14 yrs → 30%
15 – 49 yrs → 50%
50 – 59 yrs → 12%

→ Then calculate the missing one i.e, ≥ 60yrs → 100 - 92 → 8% & can construct Pie chart

Ⓠ If

0-14yrs → 30%
14- 49 yrs → 50%

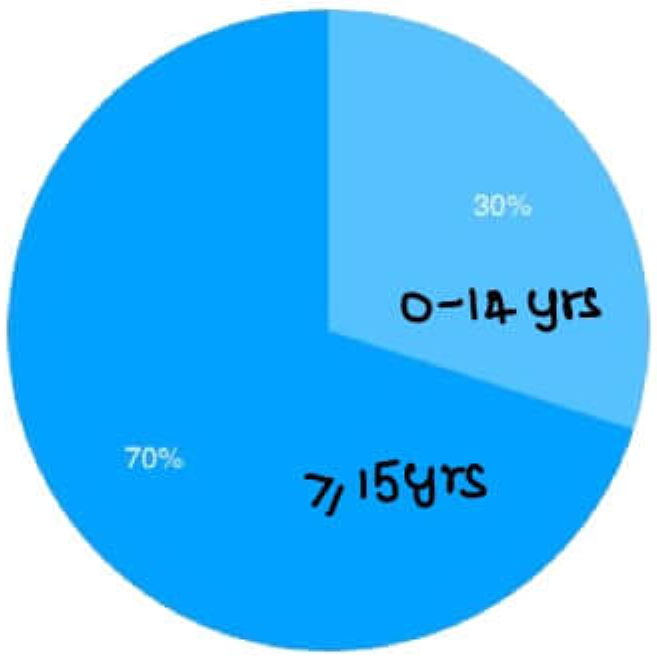
→ Then Remaining ie → ≥ 50yrs → 20%
& construct pie chart



Ⓠ If

0-14 yrs → 30%.

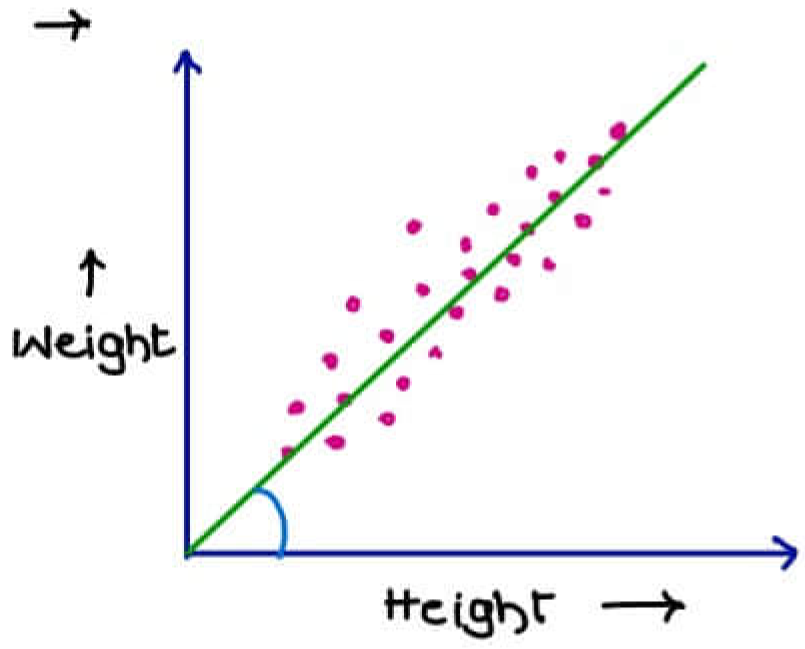
→ Then Remaining i.e., → ≥ 15yrs → 80%
& construct Pie chart



SCATTER / DOT DIAGRAM

→ Used for depiction of CORRELATION [Relationship b/w 2 Quantitative variables]

→

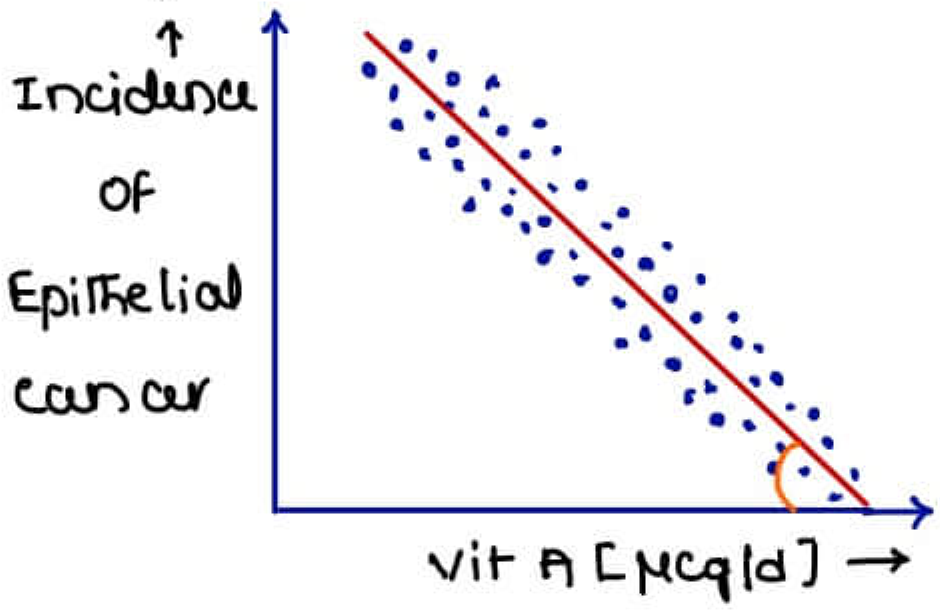


POSITIVE CORRELATION

$\boxed{0 < \gamma < +1}$

→ $\gamma_{H\&W} = +0.8$
Ht & Wt are in Positive correlat^{n}

→



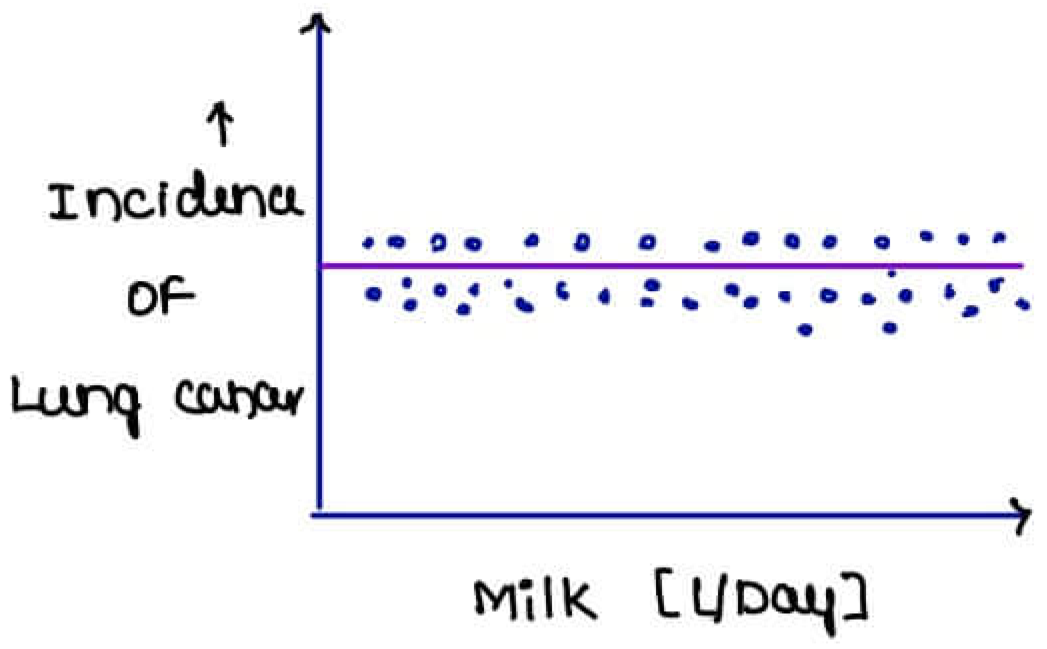
NEGATIVE CORRELATION

$\boxed{-1 < \gamma < 0}$

→ Vitamin A is protective for Epithelial cancer

→ $\gamma_{\text{condom use \& HIV Transmission}}$ → 0.9

- condom use & HIV transmission are in negative correlat^{n}
- for 1 unit of condom use, there is 0.9 unit decrease in HIV transmission
- Condom usage is protective against HIV transmission



NO/ ABSCENT CORRELATION

$\boxed{\gamma = 0}$

In a study corelatⁿ co-efficient lies between $-1 < \gamma < +1$

CO Efficient OF Determinatⁿ

→ % change in one variable that can be explained by change in another variable

→ $\boxed{COD = \gamma^2}$

Ⓠ $\gamma_{Ht \,\&\, Wt} = +0.7$

COD = ?

→ COD $= [+0.7]^2$
$= 0.49$
$= 49\%$

Interpretatⁿ → 49% ↑ in wt can be explained by ↑ in Ht
other 51% ↑ in wt can be explained by other variables

Ⓠ $r_{\text{vit A intake \& Epithelial cancer}} = -0.9$

COD interpretatⁿ → ?

→ COD $= (-0.9)^2 = +0.81 = 81\%$

Interpretatⁿ → 81% ↓ in epithelial cancer can be explained by ↑ in vit A intake
19% ↓ can be explained by other protective variables

REGRESSION

→ Structure of exact relationship b/w 2 variables

→

$$y = a + bx$$

y → dependent variable [DV]
x → independent variable [IV]
a → constant
b → Regression co-efficient

TYPES OF Regression

1. $y = a + bx$ → Simple linear Regression
2. $y = a + bx^3$ → Simple curvilinear Regression
3. $y = a + bx_1 + cx_2 + dx_3$ → Multiple linear Regression
4. $y = a + bx_1^2 + cx_2 + dx_3^9$ → Multiple curvilinear Regression

Simple → only 1 independent variable
Multiple → >1 independent variable
Linear → Independent variable has no power [=1]
Curvilinear → At least one independent variables has power

Q $SBP = 4.2 + 6.1\,[Age]^3 + 9.7\,[S.Chol]^7$ → Multiple curvilinear Regression
Q $SBP = 4.2 + 6.1\,[Age] + 9.7\,[S.Chol]$ → Multiple linear Regression
Q $SBP = 4.2 + 6.1\,[Age]$ → Simple linear Regression
Q $SBP = 4.2 + 6.1\,[Age]^9$ Simple curvilinear Regression

Q Occurance of a disease is dependent on multiple risk factors. which type of Regression it will be ?
→ Multiple Logistic Regression

If dependent variable is
- Polyotomous → Multiple Curvilinear Regression
- Dichotomous → Multiple Logistic Regression

→ Occurance of a disease → Dependent variable → Dichotomous → MLR

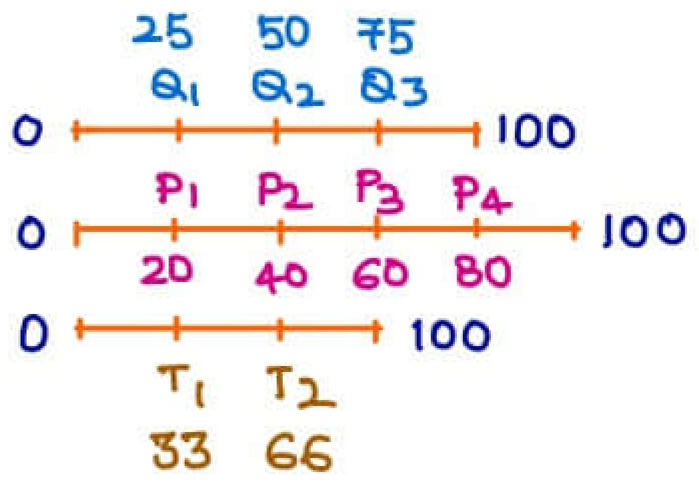
Q $SBP = 4.1 + 6.2\,[Age]^3 + 9.7\,[S.Chol]^7$
→ SBP → Polyotomous → MCLR

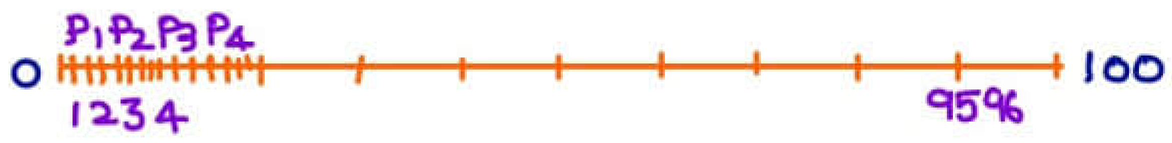
Q $HTN = 4.1 + 6.2\,[Age]^3 + 9.7\,[S.Chol]^7$
→ HTN → Dichotomous [yes or No] → MLR

LOCATIONS

→

	DIVIDES INTO Equal parts
Quartiles	4
Pentiles/Qintile	5
Tertiles	3
Percentile/Centile	100

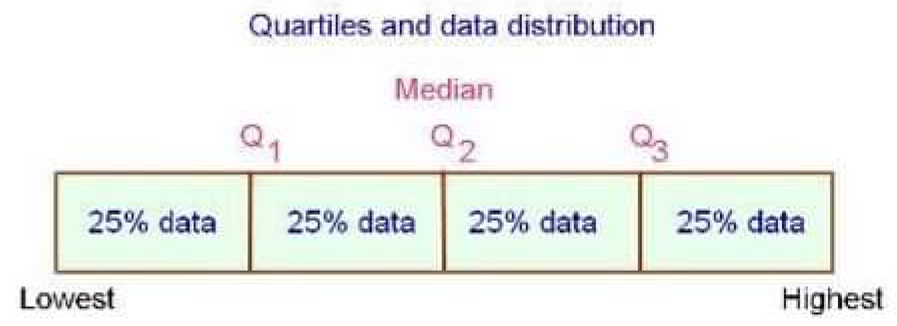




→ Q_1 → 1:3
Q_2 → 1:1
Q_3 → 3:1

P_1 → 1:4
P_2 → 2:3
P_3 → 3:2
P_4 → 4:1

T_1 → 1:2
T_2 → 2:1



Median → Q_2 → 1:1

SAMPLING & SAMPLE SIZE

SAMPLING

RANDOM / PROBABILITY / NON PURPOSIVE SAMPLING

1. Simple Random
2. Systematic Random sampling
3. Stratified Random Sampling
4. Multistage Random Sampling
5. Multiphase Random sampling
6. Cluster Random Sampling

NON RANDOM / NON PROBABILITY / PURPOSIVE SAMPLING

1. Convenience Sampling
2. Quota sampling
3. Clinical Trial sampling
4. Snow Ball sampling

SIMPLE RANDOM SAMPLING

→ Random → Equal & Known chance

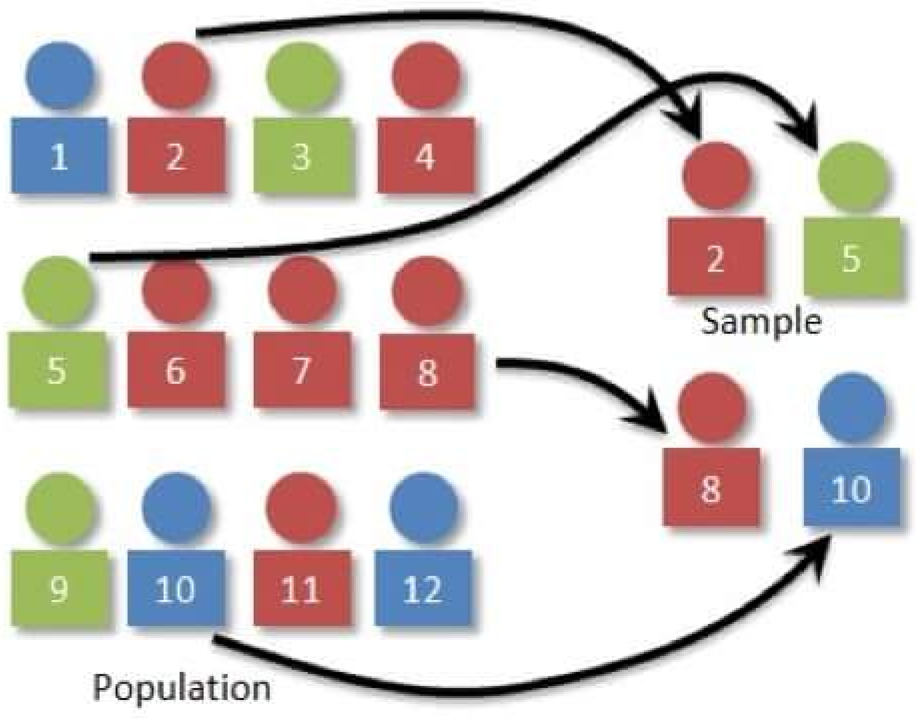
Ⓠ n = 100

Average IQ level → ?

→ Sample = 10

Methods of Sampling

1. Lottery Method
2. Random Number Tables Booklet [Most Accurate]
3. Software
4. Currency notes



SYSTEMATIC Random Sampling

→ Sampling fraction / Sampling Interval = $\frac{\text{Total population size}}{\text{Total Sample size}}$ → Systematic

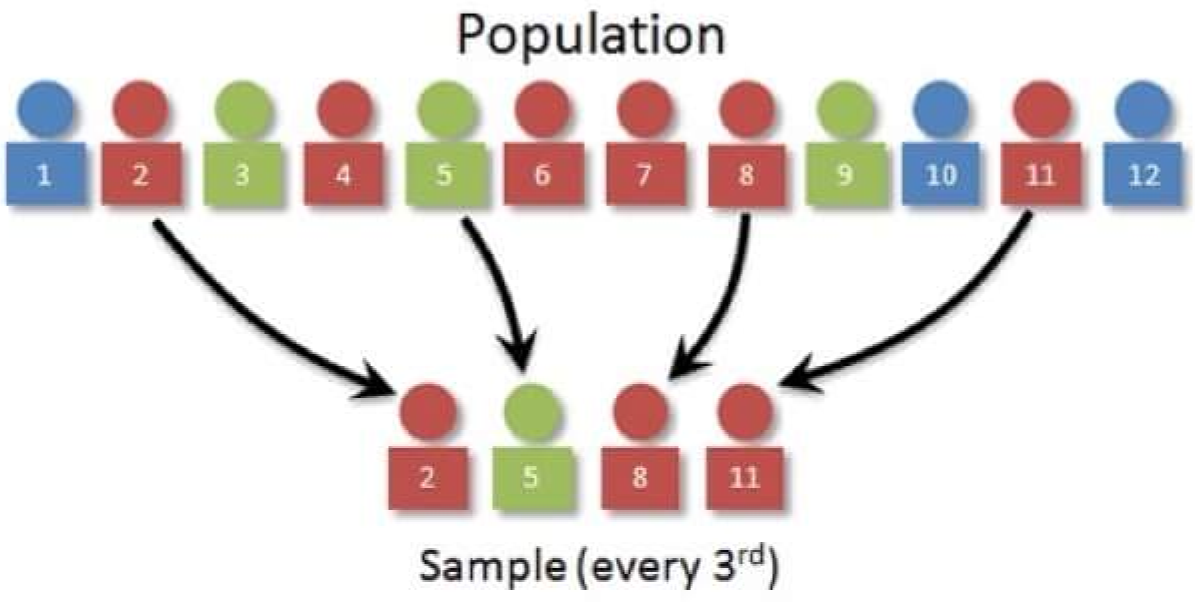
Ⓠ n = 100

Sample = 10

Average IQ level

→ $SF = \frac{100}{10} = 10$

every 10th Student selected



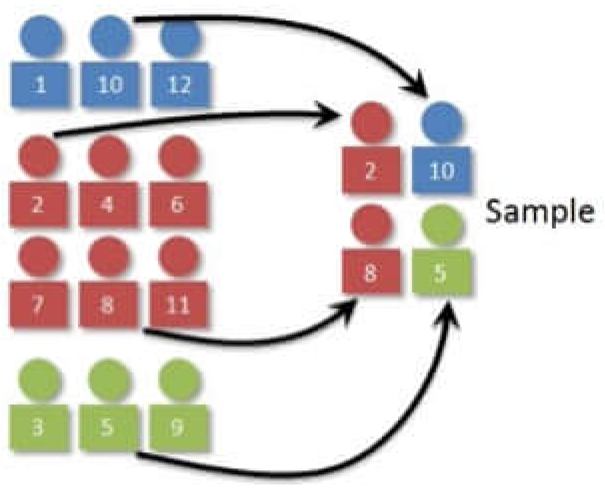
→ Random → In the 1st Row, Student will be Selected by SIMPLE RANDOM Method

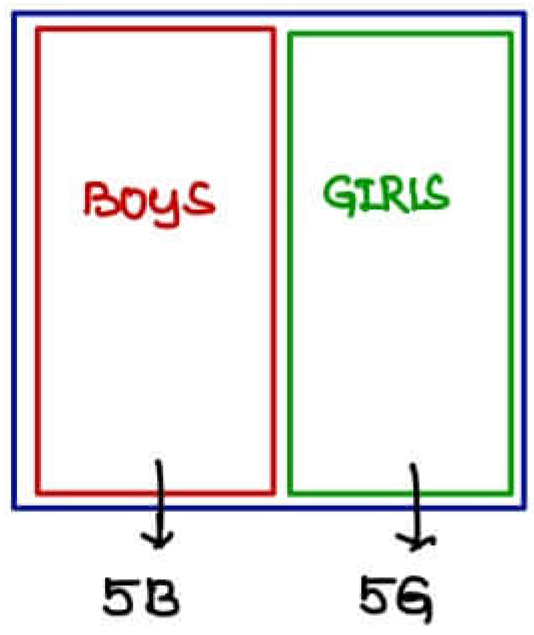
STRATIFIED RANDOM SAMPLING

Ⓠ n = 100 Students
- 50 Boys
- 50 Girls

Sample = 10

Avg. Hb level ?





→ STRATIFICATION — convers^{n} of heterogenous populat^{n} to homogenous groups.

→ Then Random Sampling is done from each group/Strata

MULTI STAGE RANDOM SAMPLING

Ⓠ n = 100 villages

→ In India → 37 States & Union Territories

↓

5 States

↓

10 Districts

↓

2 villages

↓

100 villages

→ Sampling done in Staging

Randomisat^{n} should be done in each staging

MULTI PHASE RANDOME SAMPLING

Ⓠ Sample → 100 Sputum smear +ive cases select^{n}

→ 10,000 patients / Day OPD

↓

2,000 OPD patients

1000 → NO ← cough > 2 wks

1,000 → Yes

500 → SS -ive ← SS Ex.

500 SS +ve

↓

100 SS +ve

→ Phase → part of informat^{n} is obtained in each stage & some are excluded based on that informat^{n}.

→ for Randomizat^{n}, either 1st or last stages are used

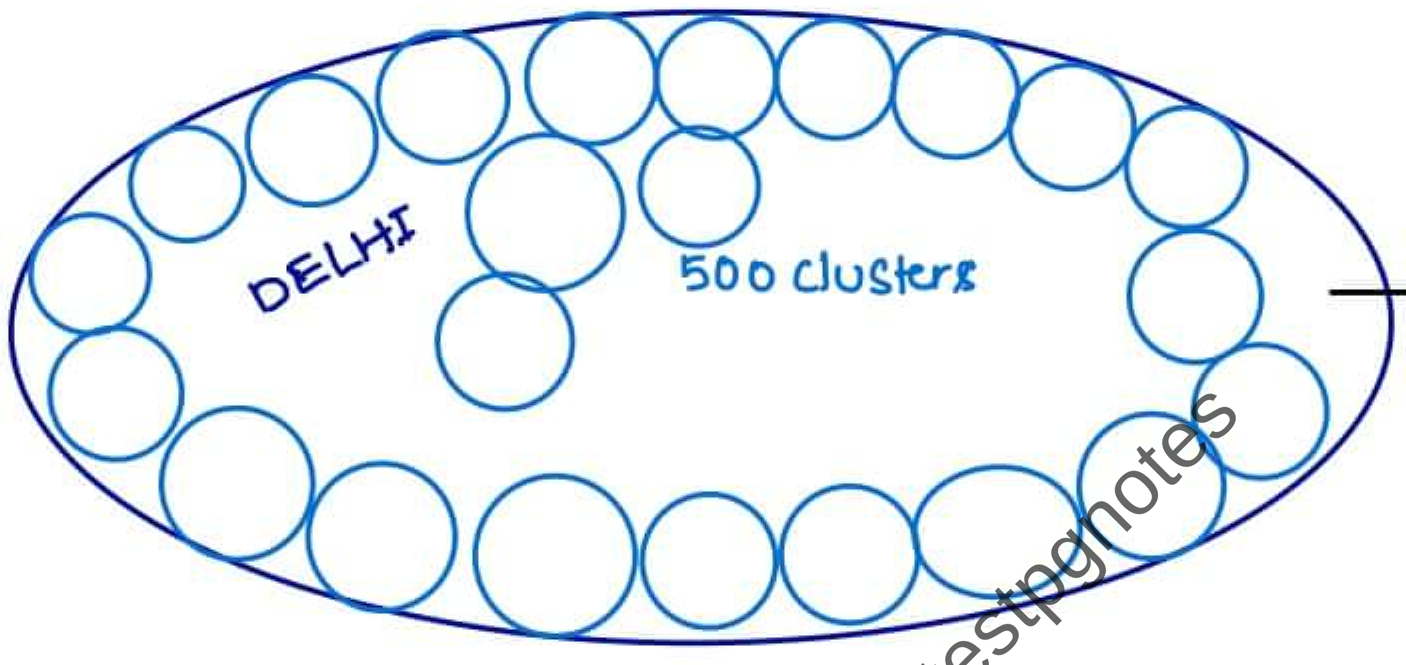
CLUSTER RANDOM SAMPLING

- → Used for Immunizat^n coverage evaluat^n
  - Simple RS, Systematic RS, Stratified RS, Multistage RS, Multiphase RS } Error is about ± 30% for immunizat^n Evaluat^n
  - CRS Error Rate for Immunizat^n coverage Evaluat^n → ± 5%

- → WHO Recommended Technique → 30 × 07

$$\begin{tikzcd} 30 \arrow[d] & \times & 07 \arrow[d] \\ \text{Clusters} & & \text{Children [12-23 months of age]} \end{tikzcd}$$

- → Eg.

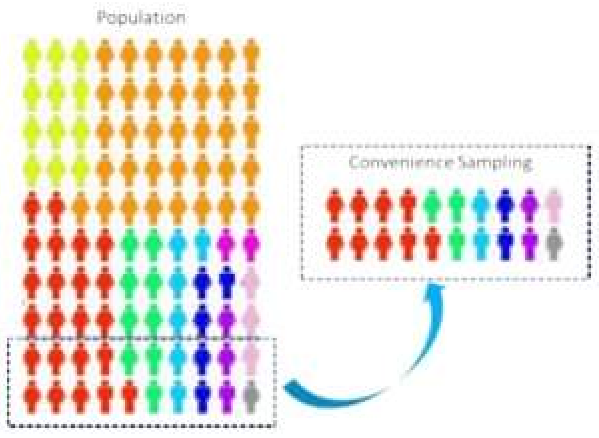


→ 30 clusters are Selected by Systematic Random Sampling
↓
Select 1st 7 children of each cluster

- → Total sample size → 210 [30 × 7]

- → **Intercluster disparity** → Even the clusters are not comparable to each other
  - To remove intercluster disparity, we use **DESIGN EFFECT**

CONVENIENCE SAMPLING



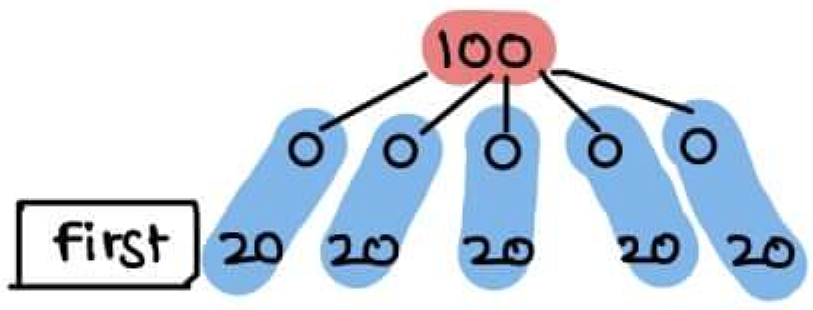
Ⓠ Avg. Hb level of all medical students [5 medical colleges] → ?
Sample Size = 100

- → Sampling according to Convenience [Availability] of Investigator
- → Non Random sampling

QUOTA SAMPLING

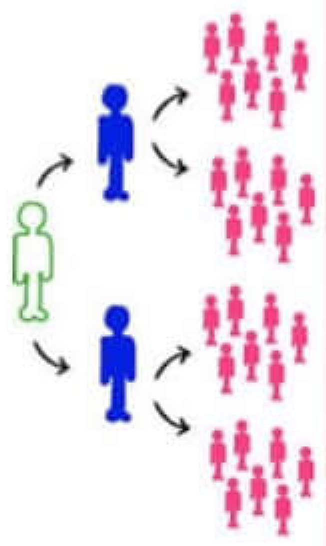
Ⓠ Avg. Hb level of all medical students [5 medical colleges] → ?
Sample Size = 100

- → BIG SAMPLE is divided into smaller Quotas & within each Quota there is Convenience Sampling



- → Non Random version of → STRATIFIED RANDOM SAMPLING

SNOW BALL SAMPLING



→ Used for Hidden Population
- commercial Sex workers
- Injecting Drug users
- HIV +

CLINICAL TRIAL SAMPLING

→ Always done First come first Basis

SAMPLE SIZE ESTIMATION

Ⓠ Prevalence OF candida = 50%.
What is the minimum sample size required to estimate prevalence of candida at 95%. Confidence level ?

→ Type of cross sectional study
formula for cross sectional study is

$$\boxed{\text{Sample size} = \frac{4pq}{L^2}}$$

P = prevalence from older study
q = 1 − p
L = permissible error

CL = 95%
L = 5% → 0.05

$$= \frac{4 \times 0.5 \times 0.5}{(0.05)^2}$$

$$= 400$$

→ Even if P is unknown, by default take it as 50%.
Even if CL is unknown, by default take it as 95%.

PROBABILITY & ODDS

PROBABILITY

→ A chance that an event will occur

→ $0 < \text{Probabity} < +1$

Rule OF Addition	RULE OF Multiplicatn
→ For mutually exclusive events $P[T] = P[A] + P[B]$	→ For independent events and we asked their joint probability $P[T] = P[A] \times P[B]$
→ BW < 2.5 kg → 0.30 2.5 − 2.999 → 0.20 ≥ 3 Kg → 0.50 Probability of a child > 2.5 kg ? $P[T] = 0.20 + 0.50 = 0.70$ Probability OF a child < 3kg → 0.5	→ BW < 2.5kg → 0.30 ; ≥ 2.5kg → 0.70 Male → 0.50 ; female → 0.50 Probability of a child BW ≥ 2.5kg, Male ? $P[T] \to 0.70 \times 0.50 \to 0.35 \to 35\%$ Probability of child BW ≥ 2.5kg, female → 35 BW < 2.5, Male → 0.15 ; female → 0.15

Ⓠ Prevalence of DM = 10%.

Probability that all 3 persons randomly selected have DM?

→ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$

- Each event is independent to each other

- $\frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \frac{1}{1000} = 0.001$

ODDS

→ chances of occurence of a specific event relative to its non occurence

→ $$\text{ODDS} = \frac{\text{Probability}}{1-\text{Probability}}$$

→ Eg

Probability of Mr. Ram developing MI in his lifetime is 75%.. What are the odds of developing MI

- $$\text{ODDS} = \frac{0.75}{0.25} = 3:1$$

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